THE MONTHLY

Review

AUGUST • • • 1947

Orange-Peel
is good in a drink

But—

You do not want it on your

BARREL DEBURRED WORK

The New

SPEE-D-BURR *

Barrel finishing method deburrs more rapidly, radius blends more readily, and produces smoother surfaces than have previously been possible in barrel tumbling. Even soft metals are free of orange peel surface.

* PAT. PENDING

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An attractive corner of original James Mont design by Modern Mode Furniture Company, New York City

Inviting... and the "Finishing" Touch is Egyptian

When a finish of particular quality is desired it is natural to turn—as does Modern Mode Furniture Company—to Egyptian.

Whether your finish problem concerns graceful furniture, heavy machine tools, modern home appliances or whatever, you want more than mere surface protection... much more. Count on easy application, lasting good looks, enhanced salability, when the finish is Egyptian. Inquiry is invited.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY

SPECIALIZED PRODUCTION FINISHES

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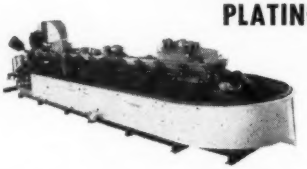
BULLETIN BOARD

Stevens "STANDARD" FULL AUTOMATIC RETURN TYPE SMALL PARTS PLATING MACHINE



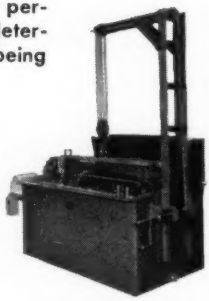
Built from the same design as our larger machines which are in nation-wide use, the "Standard" is a general purpose, compact, sturdy machine which provides high production for a small unit; rapid plating; low operating cost per pound or piece; and cleanliness of operation.

Dry floors—no wet or slippery duck boards; operator does not work over or around solutions; eliminates expensive items for operators' protection.

No overhead hoist equipment; easily and well ventilated; quickly installed.

Stevens HORIZONTAL PLATING BARREL

The cylinder is made of perforated steel, heavily rubber covered. Diameter of perforations can be any size specified—determined by the character of the work being done.



Heads of cylinder are also of perforated steel construction, giving a solid welded construction throughout.

Standard cylinder is 30" long of hexagonal shape, and 14" across the flats.

Cylinder cover, operation of clutch, steam or cooling coils, exhaust hood, hoist for cylinder and contact danglers are all of latest and most practical design.

SEND FOR FOLDER ON THESE TWO PIECES OF EQUIPMENT

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THE MONTHLY

Review

VOLUME 34 AUGUST 1947 NUMBER 8

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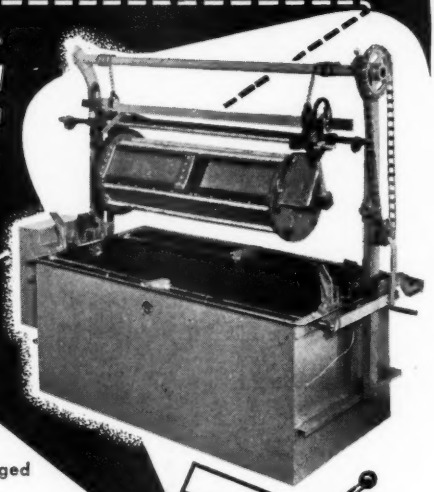
Lasalco's Richards Barrel Plater Makes Speed Plating More Profitable!



★ Negative contact can be arranged to carry up to 800 amps.

★ Heavy, flexible dangler imbedded in load gives perfect contact.

★ Easily, quickly cleaned negative connection, separated from hanger arms, brought direct to work through hollow hub.

★ Selective 3-speed drive.

★ Anode rods, conductors, connections and switches are completely insulated from tank.

★ Cylinder when lowered goes automatically into exact position thus engaging driving gears and electrical contact without operator's attention.

★ Cylinder construction of 5/16" laminated canvas Bakelite or 3/8" hard bronze rubber (as illustrated). Special rod or woven types also available.

★ Sizes, 12" (across flats) by 24", 30", 36" and 42" long for 24, 30, 36, or 42 qt. loads.

★ Gear or sheave drive.

★ Hand or tackle hoist. Ratchet device holds cylinder in any desired position.

★ Effortless, speedy raising, loading, lowering or unloading.

★ Nothing plates but the load.

If you want speed *plus* economy, get a Lasalco Richards Barrel Plater.

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Why risk rejects, slowdowns, metal loss by trying to obtain good electroplates on inadequately cleaned work? It's the long way around—and costly—particularly when specialized Oakite pre-plating cleaners are available to serve you!

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Whatever the metal, the electroplate, the production process . . . continue the good habit of consulting your Oakite Technical Service Representative on your pre-plating problems. His services are free for the asking, without obligation. Or write on letterhead to us for full free data on particular procedures. Oakite Products, Inc., 20 Thames St., New York 6, N. Y.

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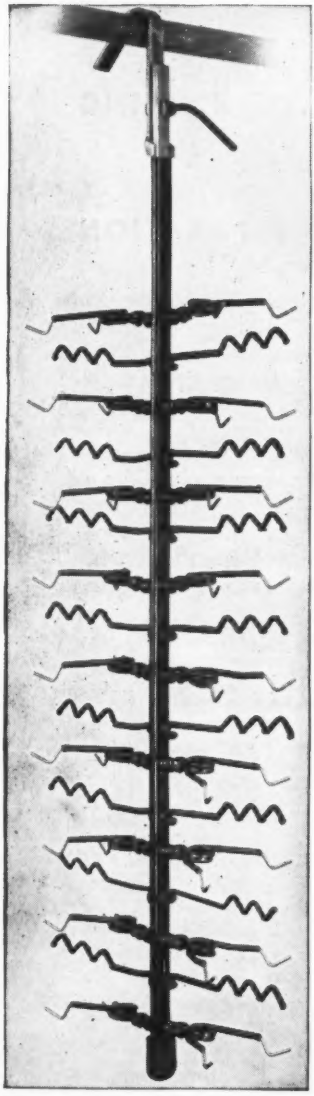
CUT YOUR PLATING COSTS



with the

STANDARD

DU-ALL PLATING RACK

For small quantity runs or for wide variations in piece parts, where the expense of custom made racks is prohibited, you can still get the advantages of Standard plating racks with the "DU-ALL" rack.

It's completely adjustable. Cathode hook may be turned to face either direction and may be changed to fit tanks of different depths. Spline is made of round edge copper, 34" long and fitted with nine studs extending through the spline and threaded on both ends. Saddle tips fit securely but may be moved to accommodate the job. Excessive current is overcome by the use of a special octopus feeder wire.

In buying racks for any plating job, remember "Racks is Our Business."

STANDARD

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¶ LABORATORIES, the most modern of their kind, large, and devoted exclusively to problems of research and development in metal finishing and electro-plating.

¶ AN ENGINEERING STAFF, composed of men with practical experience, working constantly on developments in the plating and polishing field.

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Because we realize the demand for accuracy, close contact and quick action, Miller Sales and Service Engineers are available at your plant at any time to diagnose your finishing requirements or to provide prompt, dependable answers to your finishing problems — No obligation of course.

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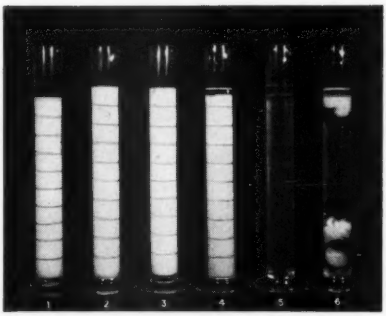
emlon enters the metal-cleaning field!

Wyandotte Chemicals Corporation announces a new detergent of solvent emulsion type — Emlon. This versatile product is especially made to meet *all* requirements for such a cleaner — as determined by the experience of Wyandotte Service Engineers.



Unretouched photograph showing the comparative stability of Emlon (1, 2 and 3) and a leading competitive product (4, 5 and 6).

Above you see the following 5% emulsions, after standing for 24 hours:
(1) Emlon in tap water; **(2)** Emlon with 2.5% of sulfuric acid added; **(3)** Emlon with 2.5% of caustic soda added; **(4)** Competitive product in tap water; **(5)** Competitive product with 2.5% of sulfuric acid added; **(6)** Competitive product with 2.5% of caustic soda added. Note separation, or complete breakdown, of 4, 5 and 6.

This illustrates the unusual *stability* of emulsions formed with Emlon. This stability results in better and faster cleaning action, longer cleaning solution life and low cleaning costs.

Ask your Wyandotte Service Engineer about this new and different product and its many applications — or write directly to us for descriptive literature.

Wyandotte
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WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

Right! IT'S "GOOD-BYE FOREVER" TO OBJECTIONABLE ODORS OF OLD-FASHIONED ADHESIVES!

BACK IN the horse and buggy days you couldn't avoid it. But now you don't have to stand for it—you don't have to put up with **S**tockyards **O**dor in polishing adhesives one minute longer. Do as progressive plants everywhere are doing. Switch to GRIPMASTER . . . the modern, more efficient, *odor-free* polishing wheel cement. **There's NO S.O. IN GRIPMASTER!**

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As close to you AS THE

NEAREST HARSHAW BRANCH

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Ample stocks are on hand to fill your order promptly.

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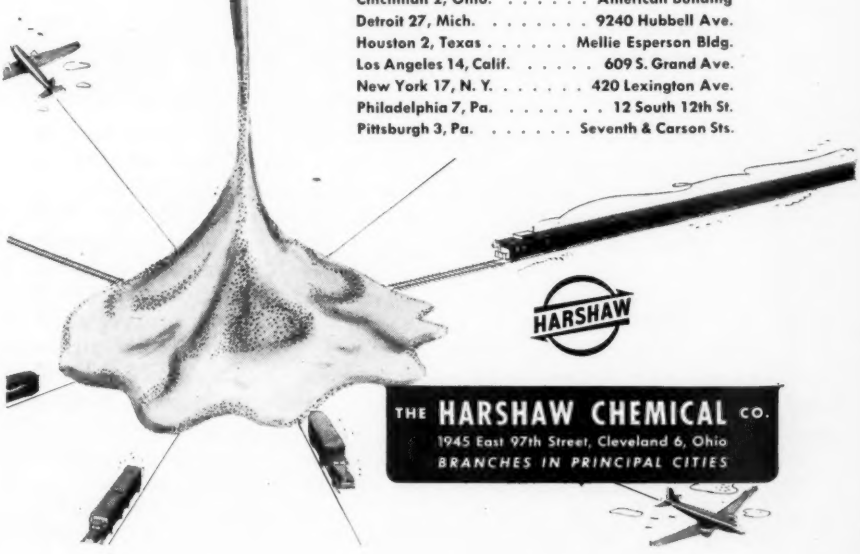
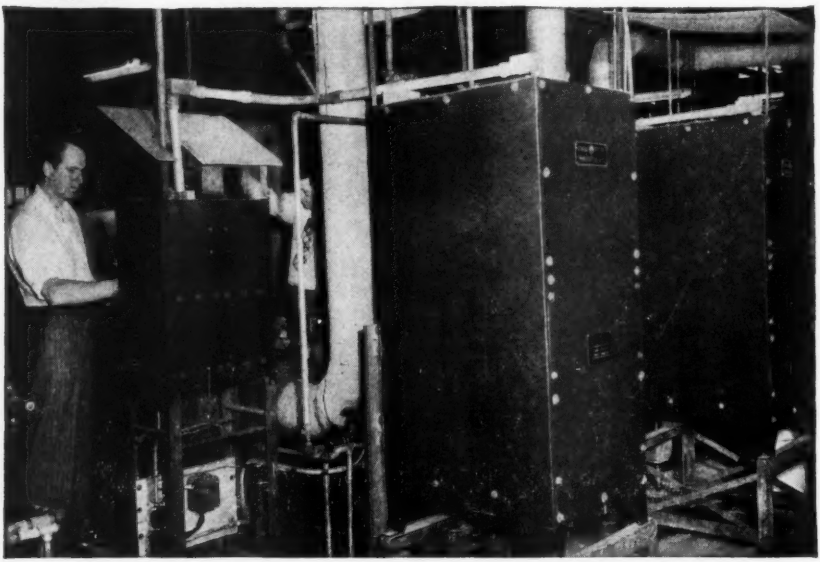
Los Angeles 14, Calif.	609 S. Grand Ave.
New York 17, N. Y.	420 Lexington Ave.
Philadelphia 7, Pa.	12 South 12th St.
Pittsburgh 3, Pa.	Seventh & Carson Sts.



THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

RECTIFIER "PACKAGES"



• View shows how rectifiers have been placed in an open, nonworking area. Units are easily accessible for inspection, and are protected from dirt and vapor fumes.

Addition of two "2000" units speeds handling of varied plating jobs

Continuing its program of adding dependable, economical rectifier equipment to meet expanding requirements for plating power, the Hartford Chrome Corporation has recently installed two new General Electric "2000" copper-oxide rectifiers and control equipment. These power "packages," consisting of a fan-cooled rectifier and an easy-to-use operator's control box, have proved invaluable in providing the flexibility needed for an ever-changing variety of work.

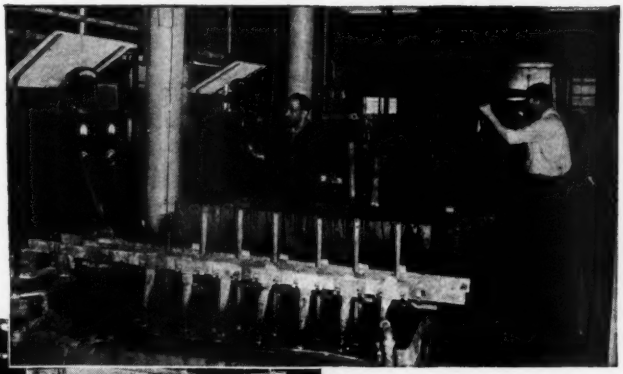
The rectifier unit is installed away from working areas, free from injurious fumes. A handy, at-the-tank operator's control governs all operations, permitting instant changes in voltage as they are required.

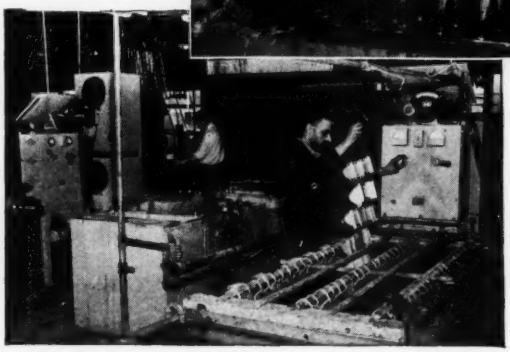
This rectifier package delivers, to the plating tank, 2000 amperes on one set of bus bars, or 1000 amperes on each of two sets of bus bars. It is also possible to connect the units in series to deliver 4000 amperes. Future plans call for addition of fully automatic motor-operated controls that will keep output voltages constant from "no load" to "full load" within ± 2 per cent of reading selected by the operator.

General Electric Equipment Selected on Basis of Past Performance

With the addition of these units, Hartford Chrome now has twelve General Electric rectifiers, with a total rating of 9000 amperes. Most

PROVIDE NEW FLEXIBILITY AT HARTFORD CHROME CORP.





- Controls are located at tank for convenience, permitting instant adjustment to meet requirements of work in tank.
- Ten 500-ampere rectifiers in use up to five years have required little maintenance, while giving almost continual service.

of the equipment has been in operation for four to five years.

During this time, maintenance costs have averaged 25 to 35 per cent lower than those before General Electric rectifiers were installed. On the basis of upkeep, performance, and flexibility, to meet every need of plating and anodizing, General Electric equipment has proved to be the most economical and efficient that this active plant has ever used.

Economies for Your Plant

General Electric copper-oxide rectifiers and controls are readily available in many sizes and capacities, to help you do better, more efficient plating or anodizing in your plant. They offer many advantages that go a long way in keeping production costs low.

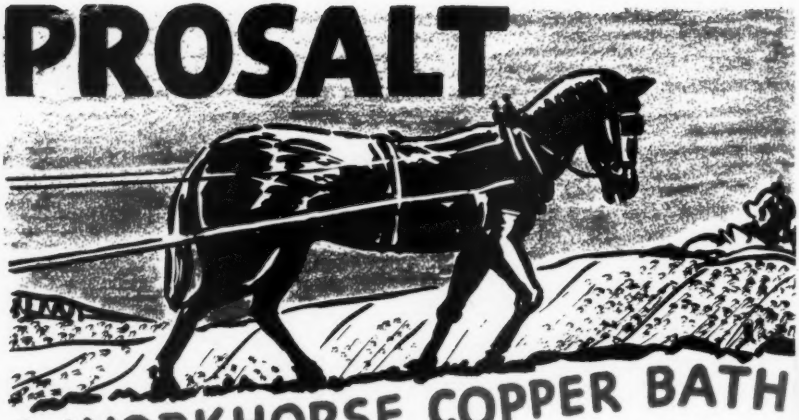
Call on us for engineering assistance, too. We may be able to show you important operating economies based on the use of modern General Electric plating equipment.

For information on the complete line of General Electric Copper-Oxide Rectifiers and Controls, write for Section A73-1, General Electric Company, Schenectady 5, N. Y.

THE *Tritan*

GENERAL ELECTRIC COMPANY CONNECTICUT

PROSALT



A WORKHORSE COPPER BATH

Top Quality at Lower Cost!

PROSALT is a liquid addition agent for a copper cyanide bath used with direct current.

This PROMAT QUALITY product has many advantages—BROADER operating range; LOWER optimum temperature; Fine grained, lighter color, more ductile deposits. Existing Rochelle baths may also be converted by the addition of 130 cc. Prosalt per gallon.

Make-Up Analysis Prosalt Copper Bath	Cost
Copper cyanide, 3.5 ounces per gallon	$0.0764
Sodium cyanide, 4.6 ounces per gallon	0.049
Sodium carbonate, 4.0 ounces per gallon	0.0075
PROSALT, 130 cc. per gallon	0.184
	$0.3169 per gallon

OSALT aids the cathode efficiency and you can expect deposits in the hood of three-quarters of one thousandths in twenty minutes at forty er square foot. The character of the deposit will be excellent for for stop-off for heat treatment and the color will be "lighter" than om a Rochelle bath. Adherence of the deposit will be excellent. on polished steel surfaces will be sufficiently bright to accept mmediately. Also, there will be no rinsing problem after its.

lable f.o.b. Waukegan, Illinois, in twelve gallon carboys

resentatives in principal cities. Write to

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Cleaning Compounds formulated by The Puritan Manufacturing Company provide platers with the necessary requirements for satisfactory plating. PURICO Compounds eliminate superfluous operations . . . save time and labor . . . minimize rejections . . . speeds up production.

Wonderbar

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Solves the tough and complex burring problem. Applied to the wheel, Pur-Bur is self-lubricating to prevent friction, embrittlement, or burned surfaces. Possesses high cutting qualities for rapid removal of burrs and fins without dangerous results.

Purico ZN

A black oxide finish that provides a lustrous black, long-lasting finish on Zinc products. Penetrates directly into the metal to eliminate the danger of chipping or flaking.

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MANUFACTURING COMPANY
WATERBURY, CONNECTICUT

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For Pickling, Plating, and Stripping Tanks— for Acid Storage

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*except for hydrofluoric.

Rectangular tanks are made in capacities ranging from 4 gallons up to 320 gallons; cylindrical pots and tanks in capacities from 5 to 500 gallons.

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Though it was the pride of the early pioneers, in their push westward, it would be entirely inadequate for present day high-speed, heavy load, transportation needs. Today's huge modern, transcontinental trailer-trucks, testify to the triumph of American progress.

Duridine*

is just as remarkable an improvement, in the metal-cleaning field. It cleans—removes oil and grease—and other surface soil—phosphatizes and changes the metallic surface into a non-conductive phosphate film, of uniform crystalline structure—provides a durable bond for organic finishes.

DURIDINE provides extraordinary protection for painted metal surfaces. It is applied by means of mild steel power-spray washers—and is a thorough, speedy and simple process.

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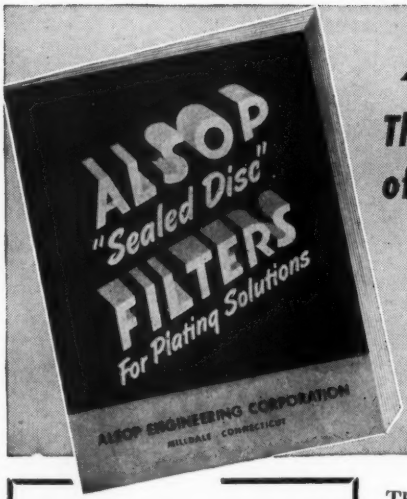

Mr. Plater—

This New Book on Filtration of Electroplating Solutions

Based on 25 Years Filtration Experience

Was written especially for YOU

A SUMMARY OF CONTENTS

The text outlines the standard techniques widely employed today in plating departments, describes the distinct advantages of using filters in various plating installations and on practically all types of plating solutions. It shows also various types of typical installations in different plants.

•

Explains the unique sealed feature which provides positive protection against loss of solution through leakage and dripping.

•

Describes the versatile, compact-Filters and outlines the superior features of the many sizes and capacities available.

This fact-filled book just off the press was compiled to tell you exactly how, why and where "*Sealed-Disc*" Filters can help you get finer finished plated work from your plating solutions. It contains 50 carefully chosen photos, diagrammatic views and 4500 words describing the "*Sealed-Disc*" Filters and "*Centri-Poise*" Pumps as well as explaining the Fundamentals of Filtration for plating applications.

The "*Sealed-Disc*" Filter for plating solution was designed in 1939 based on over 17 years previous filtration experience. Now after an additional 8 years of constant improving we feel that our latest models will meet even greater success in fulfilling the demands of the plater for a dependable filtration system. Send for your NEW BOOK today . . . mail the coupon below.

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Please send me, FREE, your NEW Book "*Alsop Sealed-Disc Filters For Plating Solutions*".

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THE MONTHLY
Review

EDITORIAL

MORE VARIED BRANCH PROGAMS

Inasmuch as many of the Branches make arrangements during the summer months with speakers for their Educational Programs, the Executive Board voted at its January meeting in Chicago to have the outgoing Educational Chairman obtain the list of speakers.

The list of 130 names which was sent to Branch Librarians is the largest ever published for our Educational Activities. It is more than a list. It represents replies received from forty-seven companies which are willing to contribute the time and expense of their representatives toward your knowledge of metal finishing. Each speaker is an authority in his field. Each one has a message for you.

As guests of your Branch, they should be extended every courtesy. Arrangements for their visit should be made as far in advance as practical in order that their normal work may be arranged.

The practice of many Branches, which hold both a business meeting and an educational meeting the same evening, to schedule the educational meeting prior to the business meeting, has many advantages, especially to the speaker. It is suggested that this practice be adopted by all Branches holding both meetings the same night.

Companies or individuals not listed, wishing to assist the Society in its educational activities, may have their names included in the next listing by writing to the Educational Chairman.

Research Activities

In discussing the activities of the Research Committee during my visits to the Branches, questions have been asked such as: How is a research project selected? Of what value are the published results of the Research Committee to me? Why should the Society support a Research

Program? Why should my company become a sustaining member when it can get all of the publications by my becoming a member?

Such questions led your Educational Chairman to believe that many of the members were not acquainted with the research activities.

In order to remedy this situation, each man associated with the Research Committee's activities was invited to participate in the Educational Programs of the Branches. Twenty-one of the thirty-nine men invited have agreed to attend Branch meetings when asked by a Branch.

In order to publicize the needs, purpose and activities of the Research Committee, it is requested that each Branch devote one meeting of the coming season to Research Committee activities.

Early History

Many of us who have entered the plating field during the last ten or fifteen years are fully acquainted with the great strides that have been made in the advancement of electroplating. While we are intensely interested in learning of further advancements in the science, in keeping abreast of new developments, and even in advancing the art of metal finishing, we would still enjoy spending a pleasant evening listening to one of the older men reminisce about the early history of the Society, early types of generators, early methods of speeding electrodeposition, of determining plate thickness, of cleaning, of overcoming non-adhesion of coatings, of eliminating pitting and spotting out, to mention only a few.

Quite often Branches desire to have a social meeting to supplement the regular technical meetings. Such meetings would be even more attractive to the membership if a speaker with a vast knowledge of "This is the way we used to do it" is featured.

With these thoughts in mind, all of the living Past Presidents and Honorary Members have been invited to participate in such meetings.

Society Affairs

During the War Years, it was difficult for the National Officers to visit the Branches for several reasons; the inability of these men to leave essential war work, difficulties of travel and hotel accommodations are still too fresh in our memories to require discussion.

Although those trying times have passed, the National Officers are still pressed for time, and it is impossible for all the Officers to visit each Branch. However, arrangements have been made whereby one Officer may visit each Branch, provided he is invited by the Branch.

In view of the limited funds available for National Officer travel, it will be necessary for the Branches to defray part of the expense of these trips, unless the visit is made in conjunction with a talk listed under "Speakers Available for Branch Meetings".

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Highlights . . .

on Convention Happenings

The A. E. S. Convention held in Detroit on June 23–27 was the largest—with a registration of over 1,600—and one of the most successful in the Society's history.

Industrial Finishing Exposition

Contributing to a large measure was the Industrial Finishing Exposition in Convention Hall, the success of which exceeded all expectations. The many interesting exhibits brought out the large attendance of 38,000 of which 5,400 were paid admissions. Complimentary and Convention registration tickets brought the remainder. A large number of exhibitors were questioned about their impressions and were unanimous in their satisfaction with the results.

It is difficult to single out a limited number of the exhibits as being most interesting. The largest crowds were undoubtedly drawn by the automatic and other moving exhibits especially when they produced souvenirs. Almost every kind of equipment, control instrument and supply item used for plating and polishing was shown. Many firms displayed plated products, and electroformed products showed the steady advance being made in that art. The exhibit of the Research Committtee, the Branches and individuals also demonstrated new methods and new thoughts.

The Detroit Branch as well as the Society as a whole certainly has reason to be proud of this accomplishment.

Exhibits Honors

The Branch and individual exhibits proved so large that there was not sufficient space for them in Hotel Statler. They were therefore transferred to the Convention Hall where they added greatly to the interest of the show.

The Exhibits Awards Committee, Third Vice-President Arthur W. Logozzo, Chairman, awarded First Branch Prize to Grand Rapids Branch, Second Branch Prize to Toledo Branch and Third Branch Prize to Bridgeport Branch. The individual winners were: First Prize—Mr. A. T. Leonard, Superior Plating Company, Minneapolis; Second Prize—Mr. O. B. Hugo, Silver City Glass Company, Meriden, Conn., and Third Prize—Mr. Philip Brod of Detroit.

Educational Features

A number of outstanding papers were presented. Special attention was given to the physical properties of electrodeposits: internal stress, tensile and thermal properties, buffability, etc. Not less than five papers dealt with these subjects, a demonstration of a growing realization of their importance to quality and cost. To this category may be added two papers on the practical applications of electroforming.

A special feature was the two sessions devoted to the work of the Research Committee. It undoubtedly increased the members' appreciation of the essential work being done by this group.

Paper Awards

Mr. B. C. Case of Hanson-Van Winkle-Munning Company received the Herminie Dorothea Proctor Award of $100.00 for his paper *Modern Applications of Electroplating Solution Purification*, and Mr. K. Gustaf Soderberg and Dr. A. Kenneth Graham of Graham, Crowley & Associates, the Founder's Gold Medal for their paper *Stress in Electrodeposits—Its Significance.* Abstracts of all the papers will appear in The Monthly Review beginning with this issue.

Monthly Review Authors Honored

The Paper Award Committee, Mr.

MYRON B. DIGGIN, Chairman, MR. W. M. TUCKER and DR. R. A. SCHAEFER, had also reviewed all the articles appearing in THE MONTHLY REVIEW during the past year. The award of $50.00 was given to DR. C. L. FAUST for the Faust-Agruss-Combs-Pioell article *Copper Plating in Alkane Sulfonic Acid Baths* which appeared in the May and June issues, and the A. E. S. Gold Medal to MR. E. A. ANDERSON of The New Jersey Zinc Company for his article *Testing of Plated Coatings on Zinc Base Alloy Die Castings*, published in March issue.

Plant Visitations

Detroit, the automotive center of the world, is singularly well supplied with large modern plating plants, a large number of which were open to Convention visitors. In Detroit there are no petty trade secrets which so long held back industrial development. Trips were also made to the laboratories of several companies, an accommodation much appreciated by the research chemists and engineers. Very special thanks go to the management of the companies that so kindly opened their doors.

Entertainment Features

True to traditional Detroit hospitality and largesse, the food and entertainment provided at the Banquet on Thursday night was of the highest order.

Special recognition is due the INTERNATIONAL FELLOWSHIP CLUB for the Open House on Monday night, an affair which has long been a highly appreciated Convention feature. The Men's Luncheon on Wednesday with Edgar Guest as speaker arranged by the JOB SHOP OPERATORS IN DETROIT AND VICINITY was another successful affair.

Space does not allow proper thanks to be extended to all those who contributed to keep the ladies happy while their husbands or sweethearts or both got themselves educated or politicked in the hotel corridors. Their happy faces testified to the success of this undertaking.

Golf Tournament Winners

The winners at the International Fellowship Club Annual Golf Tournament held at the Western Golf and Country Club of Detroit by the courtesy of MR. HOWARD MCALEER, Formax Corporation, were, according to Chairman J. J. DUFFY, JR., of Philadelphia:

MR. RICHARD JOHNSON, Wallingford, Conn., first prize, a golf bag; MR. DAN WAITS, Bay City, Mich., second prize, a golf shirt; MR. STEPHEN MILLER, Cleveland, Ohio, third prize, a golf club; MR. ROBERT W. RENTON, Cleveland, Ohio, fourth prize, club covers.

MR. WALLACE R. IVERS, Detroit, won the Formax Memorial for the longest drive, and MR. R. H. PELLINGTON, the Bus Riders Kickers.

Society Business

The proposed new Constitution was referred back to the Executive Board for further study. A new Committee will be appointed which will work in close contact with the Branches.

Amendment to the By-Laws

The following provision was added to the By-laws of the Society: Part II, Article VI Section 5:

Foreign members: The dues of foreign members not affiliated with a foreign Branch shall be the minimum annual dues and shall be payable to the Executive Secretary.

This will relieve the Branch Secretaries of the onerous job of handling foreign correspondence and exchange and supply the Society with additional funds.

Referendum on Dues Increase

In view of the impossibility of balancing the Society's budget without seriously curtailing its activities (see the Executive Secretary's Report on pp. 690-696 of the June issue), the Delegates voted to instruct the Executive Board to formulate a suitable amendment to the Constitution to raise the dues by two dollars per year, the entire amount to go into the General Fund.

Southeastern Branch Makes Showing

Although the newest Branch of the Society and one far removed from Detroit, the Southeastern Branch was represented at the Convention by not less than fifteen of its forty members.

Foreign Visitors at Convention

Among distinguished visitors to the Convention were C. W. Parker of VAB Plating Company, Ltd. and Harry Ashton of Miles Aircraft Company, both from England.

Future Convention Cities

THE NEWARK BRANCH will act as the host of the 1948 Convention and Exhibition at Atlantic City, June 28 to July 1, 1948.

The 1949 Convention will be held in MILWAUKEE and the 1950 Convention in BOSTON.

New A.E.S. Officers

The following were elected to the Executive Board at the recent Convention.

President: KENNETH M. HUSTON, Rustless Iron and Steel Division, American Rolling Mill Company, Baltimore, Md.

First Vice-President: SAM S. JOHNSTON, Weirton Steel Company, Weirton, W. Va.

Second Vice-President: ARTHUR W. LOGOZZO, Nutmeg Chrome Corporation, Hartford, Conn.

Third Vice-President: WILLIAM J. NEILL, Columbus Metal Products Company, Columbus, Ohio.

Past President: FRANK K. SAVAGE, The Kuehne Manufacturing Company, Mattoon, Ill.

WILLIAM J. NEILL

The one new name on this list is that of Mr. Neill. He was born on July 1, 1901, and attended school in a great many cities due to his father's business. Franklin University is his alma mater. He is now General Superintendent of Columbus Metal Products Co, manufacturers of oil burner and truck and bus equipment. A Past President (two terms) of the Dayton Branch, he was instrumental in organizing the Columbus Branch. He is a member of American Instiute of Chemists and Vice-Chairman of its Miami Valley Chapter, a member of the Board of Governors of the Ohio Committee for Professional Practice, and a member and Post Officer of Kiwanis International. Mr. Neill is married and the father of three children.

DR. A. KENNETH GRAHAM of Graham, Crowley and Associates, Inc., Consulting Engineers of Jenkintown, Pa., continues as *Executive Secretary* of the Society.

New Honorary A.E.S. Members

At the final business meeting the Delegates voted to elect the following Honorary Members of the Society:

ALBERT HIRSCH of the Philadelphia Branch

E. M. STEPHENSON of the Hartford Branch

HERBERT H. WILLIAMS of the St. Louis Branch

Mr. Hirsch has been a plater since 1897, starting before he even finished elementary school. Having gotten his formal education the hard way—evening classes at Central High School, Y. M. C. A., Spring Garden Institute, the old Franklin Institute, Drexel Institute, and Temple University from which he graduated with a B.S. Degree in 1932 — his great interest in life has been adult education and research . . . As Librarian of the Philadelphia Branch for twenty-five years, and teacher of electroplating in the Jules Mastbaum Vocational Evening School for sixteen years until 1946, he has contributed greatly to the advancement of knowledge among electroplaters. His experience in Philadelphia has been freely drawn upon by other Branches in their educational activities . . . Mr. Hirsch's interest in research is shown by the numerous articles on electroplating subjects which have appeared in THE MONTHLY REVIEW and by his devoted work as Chairman of the Philadelphia Branch's Research Committee.

Mr. Stephenson, a veteran of forty-five years' experience in the metal finishing industry and a specialist in lacquering, was of invaluable assistance to Charles Proctor in organizing the A. E. S. Not only did he supply many names of interested persons, but he also helped to sell the idea that A. E. S. should be an educational society and not a union . . . A member of the New

York Branch since the beginning of A. E. S., Mr. Stephenson was active in the organization of not less than four Branches: Bridgeport, Waterbury, New Haven and Hartford . . . Although seventy-seven years old, he is still an ardent supporter and regular attendant of the Hartford meetings.

Mr. Williams was a leading figure in the A. E. S. in its formative years, contributing greatly to the soundness of the decisions. He was A. E. S. president in 1916–1917 and Editor of THE MONTHLY REVIEW for two years beginning 1919 . . . It was through his efforts that the St. Louis Branch was formed, and he served as its President and Secretary for many years . . . A plater for forty-nine years, he retired on a pension in 1945.

Our fondest congratulations go to these three leaders.

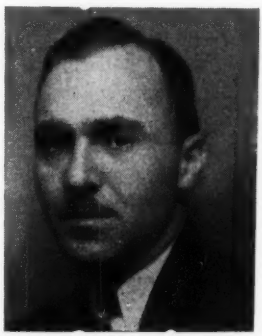
Third International Conference

DR. S. WERNICK, President of the Electrodepositors' Technical Society, has extended a special welcome to A. E. S. members to attend the *Third International Electrodeposition Conference* which will be held in London, England, on September 17–20.

The detailed program was given in the July issue of THE MONTHLY REVIEW.

Write to the Executive Secretary for a descriptive folder if you plan to go.

Fellowship Luncheon



W. Douglas MacDermid

W. DOUGLAS MACDERMID of W. D. MacDermid Chemicals Company, outgoing President of the International Fellowship Club' presided at the annual meeting of the Club in the Hotel Statler in Detroit on June 23.

New officers for the forthcoming year were elected by the Club membership. They

R. L. Redmond

are: President, R. L. REDMOND of Automotive Rubber Co.; First Vice-President, LOUIS HAGUE of Hanson-Van Winkle-Munning Co.; Second Vice-President, RUDOLPH HAZUCKA of Clinton Lacquer Company; Third Vice-President, GEORGE NANKERVIS. THOMAS

Thomas A. Trumbour

A. TRUMBOUR of Metal Industry Publishing Company continues as Permanent Secretary of the Club.

The luncheon, given through the courtesy of the Metal Industry Publishing Company, was well attended. Membership in the Club is restricted to electroplating suppliers and their representatives.

Abstracts . . .

of Papers Presented at the 34th Annual A.E.S. Convention

Physical Properties of Electrodeposited Chromium, by Abner Brenner, Polly Burkhead and Charles W. Jennings, National Bureau of Standards, Washington, D. C.

The following were obtained on a large number of deposits produced under various plating conditions: hydrogen and oxygen contents, hardness, density, tensile strength, Young's modulus, ductility, and electric resistivity. The effect of heat treatment up to 1200° C on some of these properties was determined. In addition, observations were made on the cathode current efficiency of plating and on stress in the deposits as plated. The chromium deposits plated at elevated temperature were much sounder mechanically than the bright deposits produced at about 50° C.

Stress in Electrodeposits—Its Significance, by K. Gustaf Soderberg and A. Kenneth Graham, Graham, Crowley and Associates, Inc., Jenkintown, Pa.

Having defined the expressions stress and strain, the authors offer a review of the literature in which special attention is focused on methods of measurement of internal stress. A portion of the total stress is often of thermal origin (bimetallic strip action), but this is usually small compared with the total stress. "True" internal stress is believed to be tied in with high metal overvoltage phenomena.

The authors have found minute cracking in nickel deposits on outdoor exposure test panels with and without preliminary copper coatings. These fine check cracks have in the past been considered pores in the coating. The configuration and the size of the cracks have been found to depend on properties of the base metal and on the cleaning procedure employed on preliminary buffed copper coatings. Since the stresses in the nickel deposits were of lower magnitude than their tensile strength, the mechanism of cracking is believed to be one of stress corrosion or of stress concentration at imperfections in the coatings.

New methods of determination of internal stress as well as of calculating the stress are presented.

Some stress data are given for nickel deposits from all-sulfate, Watts type, all-chloride, and fluoborate nickel baths.

Electroforming Pitot Static Tubes, by Alfred S. Kasdan, Kollsman Instrument Division of Square D Company, Elmhurst, N. Y.

The pitot static tube is used to collect pitot pressure for actuating the air speed indicator as well as static pressure for operating the air speed indicator, the vertical speed indicator and the altimeter on aircraft. The shells are electroformed to insure maximum heat transmission and because they are so complicated that they cannot be readily manufactured by other methods.

The lead-bismuth eutectic serves as mandrel material and is cast around the skeleton parts in a die casting machine. Elaborate cleaning techniques are used to insure airtight joints, after which the material is plated with agitation in a standard copper sulfate bath containing phenol sulfonic acid, fish glue, and aerosol. A minimum of 0.075 inch copper is applied. After grinding and

polishing the alloy is melted out in an oil bath, and the tube is cleaned, acid dipped, cyanide struck, and gray nickel plated.

Bulk Nickel Plating, by Henry Strow, MacDermid, Inc., Waterbury, Conn.

The importance of various features of modern nickel plating barrels are emphasized. Two types of barrel plating solutions are recommended: The first one contains 24 to 40 oz/gal nickel sulfate, 6 to 10 oz/gal nickel chloride, 4 to 5 oz/gal boric acid, 24 to 32 oz/gal magnesium sulfate, and a brightener. The preferred *p*H range is 5.2 to 5.6. With nickel sulfate, nickel chloride and boric acid toward the lower limit, the bath is used near room temperature at 6 to 8 volts. Twelve volts and 120 to 130° F are used with the high concentrations, and a conventional barrel will draw up to 400 amperes. The second bath contains 20 to 25 oz/gal nickel sulfate, 20 to 25 oz/gal nickel chloride, 5 oz/gal boric acid, and suitable organic brighteners. It is run at 120 to 130° F at a *p*H of 4.5 to 5 and has a very high conductivity. Because of the high chloride content, special care must be taken in the choice of materials and brighteners.

Details are given of cleaning and acid dipping techniques before plating as well as drying techniques after plating.

Modern Applications of Electroplating Solution Purification, by B. C. Case, Hanson-Van Winkle-Munning Company, Detroit, Mich.

Bright nickel baths are more sensitive to impurities than dull nickel baths and require regular control and removal of the impurities.

Bright nickel solutions are best freed from copper and lead, which plate out satisfactorily at 2 to 4 asf, and from zinc and iron, which require 6 to 7 asf, by using a suitably corrugated cathode with an overall current density of 5 asf. The removal is accomplished without changing bath temperature or bath *p*H by pumping the solution through special purification tanks in which they are thoroughly agitated for maximum rate of removal.

Organic impurities are best removed by activated carbon treatment. Only such bright nickel baths which contain brighteners that are *not* absorbed by activated carbon can be treated continuously, others must be batch treated at intervals.

The paper contains much badly needed engineering data for the construction and operation of purification systems with old as well as new installations.

Recent Developments in the Use of Conversion Coatings on Zinc, by J. D. Stareck and W. S. Cibulskis, United Chromium, Inc., Detroit, Mich.

This paper sets forth the results of salt spray tests and outdoor exposure in a South Florida atmosphere on steel panels coated with 0.00005 to 0.0005 inch thick cyanide zinc coatings with and without various thicknesses of electrolytically and chemically applied supplementary films of the chromate type. All of these films increase the time in the salt spray which elapses before white corrosion forms, and most of them have the same effect in the outdoor exposure. The time for first rust to appear in the salt spray is also increased, especially with the thinner zinc deposits. In general, the anodic type of conversion coating gives the best protection. The purer the zinc deposit and the smoother the base metal the better are the results obtained.

A number of practical applications of the conversion coatings are listed. Outstanding among them are refrigerator shelves finished with a clear conversion coating and a clear synthetic organic finish.

Deposition of Nickel and Cobalt by Chemical Reduction, by Abner Brenner and Grace Riddell, National Bureau of Standards, Washington, D. C.

This is a continuation of the work reported in 1946 on deposition of nickel from an ammonical solution containing hypophosphites. The process has now been extended to include deposition of nickel from acid solutions containing 30 g/l nickel chloride, 10 g/l sodium hypophosphite, and 10 to 50 g/l of sodium hydroxyacetate or

10 g/l of sodium citrate at a *p*H of 4 to 6. All deposits were semi-bright, and the rate of deposition was as high as 0.0006 inch per hour in the hydroxyacetate bath. Good cobalt or cobalt-nickel coatings could not be had from acid solutions but were obtained in alkaline solutions. The most rapid cobalt bath, which deposited 0.0006 inch per hour, contained 30 g/l cobalt chloride, 20 g/l hypophosphite, 35 g/l sodium citrate, 50 g/l ammonium chloride, and sufficient ammonia to raise the *p*H to from 9 to 10. These deposits were dull. With nickel chloride in the ammoniacal cobalt bath, semi-bright cobalt-nickel alloys were obtained at the same rate.

Certain metals and radicals, cadmium and sulfocyanide, had a detrimental effect in all the baths; copper and lead were detrimental both in alkaline and in acid nickel baths; zinc reduced the rate of deposition in the alkaline nickel and cobalt baths; and magnesium and ferrous iron had the same effect in the alkaline cobalt bath only.

The deposition takes place only on certain surfaces that catalyze the process, namely on iron, nickel, active gold, cobalt, aluminum, and palladium. Deposition can be obtained on non-catalytic metals such as platinum, copper and brass if momentary contact is made with an electronegative metal such as aluminum or iron or a thin layer of a catalytic metal such as palladium is first applied to the surface by immersion. No success was had with deposition on plastics.

Evaluation of the Buffability of Nickel Deposits, by R. O. Miller, Electric Auto Lite Corporation, Sharonville, Ohio, and A. H. Du Rose, Harshaw Chemical Company, Cleveland, Ohio.

Buffability is the ease with which lustrous finish is obtained and base metal imperfections are covered or camouflaged, consideration being given to the amount of pull exerted by the buffing wheel on the plated piece.

The work was done on an automatic buffing machine so constructed that the pressure of the buff against the test panel as well as the pull of the buff on the test panel could be measured. The panels were made of hot rolled heat-treated, air quenched, and pickled SAE 1085 steel and of a cold rolled NAX steel of the 9100 series as received from the mill. They were polished to various degrees of finish and scratched to different depths, then plated in a Watts type bath, a semibright high chloride bath, a fluoborate bath, or three proprietary baths containing addition agents.

From the large amount of experimental data it is concluded that the luster after buffing depends greatly on the brightness prior to buffing but not on the base metal finish except when the latter is very rough. The coating thickness had only a negligible effect on luster. The ability to cover imperfections depends greatly on the finish of the base metal but not on the thickness of the deposit. The composition of the nickel bath is especially important and in particular the addition agents. The drag of the buffing wheel depends on the smoothness of the deposit and its luster before buffing.

Results obtained by a hand buffer agreed in general with the mechanical results, except that the buffer based his opinion more on the amount of drag and luster than on covering of scratches. Also, the buffer did not duplicate his results as well as the buffing machine.

Barrel Chromium Plating, by G. Dubpernell and S. M. Martin, United Chromium, Inc., Waterbury, Conn., and New York City, respectively.

Following a well-illustrated historical review of previous attempts to chromium plate small parts in barrels and other tumbling equipment is a description of new equipment and methods which have proved commecially successful. The new barrel is an open-ended horizontal cylinder, with a bare steel inside surface and an insulated outside surface. A very deeply serrated lead anode is placed inside the cylinder during plating and swung out of the bath after plating so that the cylinder can be removed for emptying. Vigorous agitation is used to maintain the desired bath composition inside the cylinder.

The speed of rotation of the cylinder is very low in order that the parts stay in electrical contact with the inside steel surface at all times.

The silicofluoride type chromic acid bath is employed, the sulfate type having too narrow range for uniform coverage of many parts.

There is a detailed description of how to plate different kinds of work as well as of pre- and post-treatments.

Not only decorative chromium coatings but also much heavier deposits have been applied in this equipment.

Standardization of Buffing and Preparation of Atmosphere Exposure Test Panels, by C. C. Cupps, Standard Steel Spring Company, Newton Falls, Ohio, and A. Kenneth Graham, Graham, Crowley and Associates, Inc., Jenkintown, Pa.

Copper-nickel-chromium plated panels for outdoor exposure tests frequently require buffing of the copper or the nickel or both. Since specified minimum thicknesses are essential, it has been found necessary to standardize the buffing loss. The results obtained by hand buffing were found to be very variable, and an automatic machine was developed which gives much more uniform results. This machine is described, and data are given on the results obtained with it and with hand buffing.

The machine is believed to be of value for the comparison of buffability of plated coatings.

Bright Brass Plating of Die Castings, by Stanley J. Beyer, Hart Manufacturing Company, Louisville, Ky.

A highly lustrous brass coloring is obtained by applying copper and bright nickel with a final thin coating of brass. Plating conditions and analytical procedure for the brass bath are given.

K. G. SODERBERG.

New Name Contest

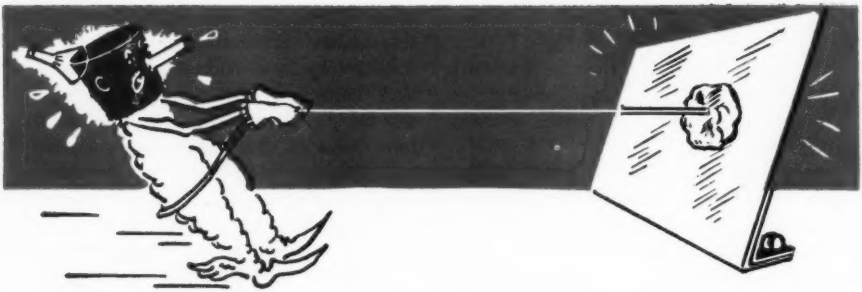
The new Executive Board at its initial meeting authorized the Executive Secretary to conduct a contest among the members of the Society to obtain suggestions for a new name of THE MONTHLY REVIEW, a move long overdue.

The present name was satisfactory as long as the circulation of the magazine was limited to A. E. S. members and no advertisements were carried. Now these conditions have changed. No outsider, be he a subscriber or an advertising agency man, can guess the purpose or field of a magazine called THE MONTHLY REVIEW.

The contest is now open. All entries postmarked August 31 or earlier will be considered. The members of the Executive Board will serve as judges, and their decision will be final.

The winner of the contest who submits the best suggestion for a well sounding, descriptive and short name will receive a prize of $50.00.

Put your entry on a postal card together with your name, address and Branch affiliation and mail to P. O. Box 168, Jenkintown, Pa. Do it soon.



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The Monthly Review

ELECTROLYTIC POLISHING

Theory and Practice

JOSEPH MAZIA

Metallurgist, American Chemical Paint Company—Ambler, Pa.

History

Electrolytic polishing, the most recent addition to the family of electroplaters' processes, did not enter this world with the suddenness of the atomic bomb. It was anticipated in the patent literature at least as early as 1928 when there was issued to Burns and Warner a patent[1] on the anodic electrocleaning of metals in phosphoric acid solutions containing preferably 70 to 100 per cent phosphoric acid and operated in the temperature range of 50° to 100° C (122° to 212° F). The stated objects of the invention were (a) to improve methods of electrocleaning metallic surfaces and (b) to provide an electrolyte particularly well adapted to the electrocleaning of ferrous metals preparatory to nickel plating. In addition, the text of the patent contains this statement: "It has been found that electrolytes composed of phosphoric acid when employed in an anodic electrocleaning process produce an etched surface having the characteristics desired for electroplating and, when the electrolyte temperature and concentration are carefully regulated, a brightly polished, uniformly etched surface is produced." Thus Burns and Warner not only anticipated the birth of electrolytic polishing as an independent process but also one of its important modern applications, the preparation of metal surfaces for electrodeposition.

The first successful commercial use of electrolytic polishing was in the production of aluminum reflectors by the Aluminum Company of America's ALZAK process with fluoboric acid as the electrolyte. The electrolytically brightened surface is subsequently treated anodically in sulfuric acid to produce a hard, glassy, corrosion resistant and abrasion resistant surface with reported reflectivities as high as 84 per cent. Edwards[2] reported on the use of this process as early as 1934.

The true birth of electropolishing dates back at least as far as 1930 with the brilliant French electrochemist, Pierre A. Jacquet, the accredited sire. His patent[2a] escaped public notice, at least in the United States, but is nevertheless extremely important since it is the first instance when an electrochemical process was divulged which had as its primary purpose the polishing of metals by electrolytic means. Jacquet disclosed in his patent that copper, treated as anode in an electrolyte consisting of orthophosphoric acid and ether, could be given a mirror finish if the temperature and anodic current density were controlled within proper limits. He also stated that nickel, aluminum, zinc, iron, lead and tin could be satisfactorily polished in a bath of perchloric acid and glacial acetic acid.

In 1935 Jacquet contributed two papers[3,4] which made electrochemists all over the world sit up and take notice. Even greater was the impact of his paper "On the Anodic Behavior of Copper in Aqueous Solutions of Phosphoric Acid" presented in 1936[5]. The beautiful results achieved by Jacquet stimulated the interest of electrochemical researchers in what happens when the flashy lustre is imparted to the anode in these syrupy electrolytes. Anodic polishing was "off to the races" when laboratory men

started switching anodes with cathodes in every conceivable liquid which would carry an electric current.

Today electropolishing is an important tool of the metal finisher as well as the metallographer. It has not to any large extent replaced mechanical polishing with abrasives, nor is it anticipated that it will do so. Rather, it has become a useful complement to mechanical methods in applications where these methods have failed or have proved cumbersome and expensive. For example, in commercial polishing of stainless steels of the high chromium or chromium-nickel types, on which the low heat conductivity of the alloys and the high frictional forces generated by abrasive action cause "burnt" or oxidized areas, electropolishing has found its widest industrial application[6–22]. In polishing intricate objects, small parts and articles of "gingerbread" design which tear buffs, have sections inaccessible to the wheel, or are difficult to hold against the wheel, the electrolytic method with its often remarkable anodic "throwing power" frequently presents a simple solution to a difficult problem.

For electrolytic polishing to be effective, the conditions of the process must be controlled in such a manner that projecting portions of the anode surface are dissolved at a much faster rate than recessed portions. When the solution is properly designed for the metal being treated and the temperature and anode current density controlled within suitable limits, a luster is developed on the surface of the metal owing to the leveling action which results from the preferential solution of the metal peaks. Light rays directed at an unpolished surface are diffusely reflected in many directions while those directed at a polished surface are reflected substantially in the same direction to an extent depending on the degree of polish achieved.

Most commercial alloys contain more than one solid phase (for example, plain carbon steel consists essentially of iron and iron carbide), each phase having a different potential and hence a different solubility in a given electrolyte. Therefore, an important requirement for an electrolytic polishing process is that all of the solid phases in the preferentially dissolved areas be removed at substantially the same rate[23]. The necessity for meeting this condition imposes the main limitation on the process, namely the difficulty in adequately electropolishing multiphase alloys or metals containing nonmetallic inclusions. These heterogeneous structures are subject to preferential attack on one or more of the solid phases and excessive solution of the metal surrounding insoluble inclusions. The result is the appearance of voids, pits or inclusions in high relief (Fig. 1) which interfere with the production of quality finish and make the metal look "dirtier" or less dense than it really is[23,24].

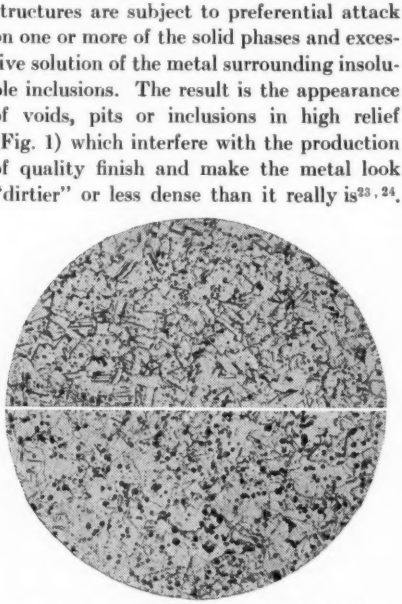

Fig. 1. Polished copper etched with ammonia-hydrogen peroxide. Top half polished mechanically, bottom half electrolytically. Note exaggeration of inclusions in the latter. X75

The history of electropolishing, as reflected in the literature, is largely one of the development of suitable electrolytes for intended applications. It also comprises many researches into the critical conditions of surface pretreatment, solution temperature, current density and power requirements. In the early years of the development, the patent situation was confused particularly in respect to the use of phosphoric acid-ulfuric acid mixtures. However, in 1939, 1940 and subsequent years, many articles appeared in the technical literature on electrolytic polishing of metals, particularly stainless steels, the patent controversies were more or less cleared away, and one could go to the patent literature for information on the various processes.

The first U. S. Patent which claims invention of a method of electrolytic polishing by anodic treatment was issued to Blaut and Lang in 1938. Dealing primarily with an electrolytic descaling of stainless steel, the Blaut-Lang disclosure states that a luster and "controlled finish" can be produced on chromium alloy steels by anodic treatment in a bath containing 30 to 50 per cent sulfuric acid by volume and 2 to 20 per cent hydrofluoric acid by volume. Preferred baths are discussed by Lang in an excellent article[26].

Perhaps the most extensive work in the electropolishing field was performed by a group of men at the Battelle Memorial Institute to which have been assigned a large number of patents issued to Charles L. Faust. In this work, which is covered by patents issued from 1942 on, methods were developed for anodic polishing of many of the common metals and alloys[13, 17, 19, 22]. Although incomplete, the following list will present an idea of the types of solutions developed by the Battelle group:

1. Sulfuric and ortho-arsenic acids for polishing 18–8 and 25–12 chromium-nickel stainless steels, Monel and Chromel
2. Ortho-arsenic and chromic acids for copper, zinc, brass, stainless steel and nickel alloys
3. Phosphoric and arsenic acids for brass
4. Phosphoric, ortho-arsenic, sulfuric and chromic acids for aluminum
5. Sulfuric acid and glycerine for stainless steel, nickel and German silver
6. Sulfuric acid, phosphoric acid and glycerine for Monel
8. Sulfuric acid, glycerine and hydrochloric acid for ordinary steel
9. Phosphoric and arsenic acids for 18–8 stainless steel and copper
10. Phosphoric, sulfuric and perchloric acids for stainless steel and nickel alloys
11. Phosphoric and sulfuric acids for stainless and plain carbon steel
12. Phosphoric, sulfuric and chromic acids for plain carbon steel
13. Phosphoric and chromic acids for copper and plain carbon steel
14. Phosphoric acid and trivalent aluminum for copper
15. Phosphoric acid and chromic acid for stainless steel and nickel

Other electropolishing patents of interest are the Delaplace and Bechard patents[27] covering the use of pyrophosphoric acid plus an organic agent such as alcohol for polish-

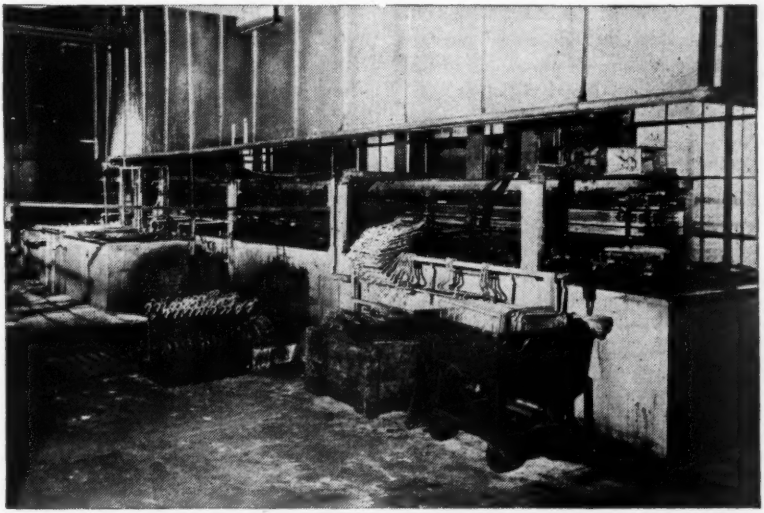

Fig. 2. Electropolishing of stainless steel refrigerator shelves. Courtesy of Rustless Iron and Steel Division of American Rolling Mill Company

ing steel and the Ostrofsky patents[28, 29] assigned to the Rustless Iron and Steel Division of American Rolling Mill Company on the polishing of stainless iron and steel in sulfuric and citric acids with and without the admixture of methyl alcohol. The latter process has found wide commercial use on wire forms and resistance welded wire assemblies of stainless steel such as refrigerator shelves (Fig. 2) and meat racks. It has also been used for such articles as kitchen tools, sausage molds, film developing racks, blowgun forgings, surgical instruments, dental instruments and small knurled parts.

Still another interesting process for electropolishing stainless steel is the one developed by Uhlig of the General Electric Company which makes use of phosphoric acid-glycerol and phosphoric acid-ethylene glycol ester mixtures[12, 16]. Practical application has been made of this method also in the finishing of stainless steel refrigerator shelves which are most difficult to polish by conventional means.

Recently E. I. du Pont de Nemours & Company has publicized and begun the sale of mixtures of sulfuric and glycollic acids for polishing of stainless steel.

Theory

When a piece of metal is placed as anode in a well-designed electropolishing bath and treated at a relatively high anode current density, a large volume of oxygen is given off at the anode and metal dissolves. A heavy viscous film appears on the anode surface as a clinging blanket which consists of a highly concentrated, possibly saturated solution of salts of the anode metal. The presence of the film results in high anode polarization and offers a high resistance to passage of current. Being highly viscous and often containing slow-moving complex ions, the film tends to remain on the surface and increase in thickness in its valleys while it naturally falls away from its peaks. Thus the resistance to flow of current is much higher in the valleys than on the peaks. The latter, therefore, dissolve at a much more rapid rate than the former and leveling or polishing results.

An often repeated experiment illustrates clearly the effect of resistance and polarization, for example, on a brass anode in a bath containing 95 per cent by volume orthophosphoric acid (85%) and 5 per cent by volume sulfuric (96–98%): If the voltage is raised slowly in a stepwise fashion and the voltage plotted against the corresponding current density, it will be seen that at first the current density rises with rising voltage. At a critical voltage, a plateau is reached on which a further increase in voltage does not result in increased current density. Above a second critical voltage, the current density again rises with a rise in voltage. It is on the plateau that the best polishing is obtained. The plateau current density produces an anode film of the right resistance and polarization to keep the valleys from dissolving at as fast a rate as the peaks.

In designing electrolytes for anodic polishing it should be remembered that the polarization film on the anodes must be such that all the phases present in the surface dissolve at substantially the same rate. Otherwise there would be selective attack of one or another phase (Fig. 1) and an etched finish would result. This is not important with single phase alloys like 18–8 austenitic stainless steel or 70–30 cartridge brass but is very important with polyphase systems such as carbon steel, low brass and 17 ST aluminum.

Conditions of Operation

Although the conditions of operation of various electropolishing processes may vary, the following examples of practical procedures are typical:

ELECTROPOLISHING OF BRASS*:

Solution:

Orthophosphoric acid (85%) ..... 95% by vol.

Sulfuric acid (96–98%) ..... 5% by vol.

Temperature: 140 to 150° F

Anode current density: 2 to 4 asi

Voltage: Usually 5 to 10 volts. The optimum value is achieved by raising the voltage gradually until a small increment causes no further increase in current density; it will vary with temperature, anode to cathode spacing, degree of agitation,

*Covered by patent assigned to Battelle Memorial Institute.

volume and exact composition of the bath.

Tank: Lead-lined wood or steel, glass, acid-proof ceramic.

Heating and Cooling: Lead coils may be used with the same type of control that is supplied for chromium plating tanks.

Cathodes: Annealed copper sheet, or copper tubing, preferably coated with tin-lead alloys, lead or speculum, through which cold water may be run to cool the bath. The cathode area should be at least 20 times the anode area.

Final rinse: After water rinsing of brass, a phosphate film may still remain which stains the brass white when it dries. A dip in a 1 per cent solution of nitric acid will clear up this condition. This solution should also be rinsed off in water before drying or plating.

ELECTROPOLISHING OF STEEL†:

Solution:

Sulfuric acid (96–98%).... 12.5% by vol.
Orthophosphoric acid (85%) 65.0% by vol.
Water..... 22.5% by vol.

This bath works well on stainless steels but may be modified for excellent results on plain carbon steel by dissolving in it about 10 per cent by weight of chromic acid.

Temperature: 145 to 155° F for stainless steel, 135 to 140° F for carbon steel

Anode current density: 1 to 5 asi

Voltage: Usually 8 to 15

Tanks, heating and cooling coils and cathodes: the same as described for the brass polishing

ELECTROPOLISHING OF STAINLESS STEEL‡:

Solution:

Sulfuric acid..... 15–25% by weight
Citric acid..... 55–60% by weight
Water..... Balance

Temperature: 185 to 200° F

Anode current density: 100 to 150 asf for new baths, 75 to 100 asf for old baths. Current densities up to 300 asf are possible.

Tanks: Lead-lined, glass, acid-proof ceramic

Voltage: 6 to 15 volts

Cathodes, heating and cooling coils: The same as described for brass polishing

On many kinds of work and in many polishing processes absence of agitation may result in a streaked or wavy surface which seems to be associated with the paths of rising oxygen bubbles. Irregular, jerky agitation is desirable to disturb the gas layer and help it to disengage itself. Agitation also tends to speed the polishing because it disturbs the high resistance film which blankets the anode.

No definite figure can be given for the time necessary to polish an object. This must be determined by experimentation with the particular article in question since it depends on many variables, especially the surface condition at the start of polishing, anode to cathode spacing, bath temperature, current density, agitation and the desired finish. It is suggested that all of these factors except current density be kept constant and that the current density required to polish a piece in a specified time be determined and recorded. Other things being equal, the speed of polishing will be greater, the higher the current density.

Since high current densities are employed, racks must provide positive contact through mechanical clamping or spring pressure. The rack designs used in hard chromium plating are usually satisfactory for electrolytic polishing.

Applications

During the war solutions for electrolytic polishing were put to a large number of uses other than the production of decorative finishes. By suitable changes in conditions of operation, matte and etched finishes were obtained, for example to reduce reflectance yet obtain a reasonable degree of smoothness. Mirrors and reflectors were made by the process to replace expensive and labor-consuming mechanical processes. In some instances, electropolishing was used as a precision machining tool where it was desired to remove evenly a layer of metal too thin to be lapped off with abrasive.

†Covered by patents assigned to Battelle Memorial Institute.

‡Covered by patents assigned to the Rustless Iron and Steel Division of the American Rolling Mill Company.

Today electrolytic polishing has been reported[22] as being used for finishing refrigerator shelves made of stainless steel, certain types of cutlery, vacuum bottles, waffle irons, electric irons, surgical and dental instruments, wire, needles, jewelry, household and cabinet hardware, aircraft and automobile spark plugs, gears, radiator caps, hub caps and a vast number of other articles. In many cases it is used for combination deburring, descaling, and polishing. It has been and is being employed to reduce slightly oversize parts, to lower skin friction of rubbing surfaces, and to remove surface irregularities which if left, would act as stress raisers and cause early fatigue failure of parts subjected to alternating stresses.

The applications most interesting to the platers are (1) electropolishing in the preparation for plating and (2) electrobuffing of plated metals such as nickel[20]. When properly engineered, the first application eliminates much costly wheel work and results in superior adhesion of the electrodeposited coatings. The outstanding champion of this use is Faust of Battelle Memorial Institute who has demonstrated that it improves adhesion because it removes the heavily worked layer of metal produced by wheel polishing. This worked surface layer is brittle and weak and often gives way under a plated coating if the part is subjected to much impact or flexure. Electropolishing exposes a surface of clean crystalloid faces to the plated metal. Blum and Rawdon[30], Graham[31] and others have shown that electrodeposited coatings tend to follow the crystal pattern of the basis metal and that when this occurs, atomic adhesive forces operate to hold the coating. This result requires that the surface to be plated be as nearly clean and free from oxides or other films as possible. Steels of certain compositions coming out of an electropolishing bath may be passive owing to anodic oxidation. When this is the case, an acid dip before plating is beneficial. However, experience has shown that plain carbon and many low alloy steels polished in the phosphoric-sulfuric solution cited above will always "take" an excellent hard chromium plate when the regular procedure of anodic treatment in chromic or sulfuric acids have preceded the chromium plating.

Electrobuffing of electrodeposits is practicable in some instances but must be controlled carefully to prevent removal of too much metal from high current density areas. Again, many electrobuffed deposits such as nickel usually must be activated in an acid dip or by abrasion before they will accept a tightly adhesive electrodeposit.

"Brush" Electropolishing and Electrolytic Lapping

"Brush" electropolishing and electrolytic lapping are two unique applications which have yielded interesting results. In the first process, a portable "brush' electrode is made of a metal core with an envelope of glass cloth or other solution-retentive material around one end (Fig. 3).

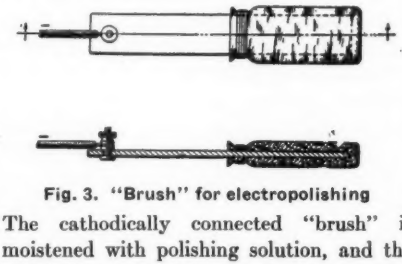

Fig. 3. "Brush" for electropolishing

The cathodically connected "brush" is moistened with polishing solution, and the anodically connected work is polished with the brush. Eight to 12 volts are used in this operation, and the solutions need not be heated. The polishing effect is, of course, limited to the area contacted by the brush. Chief applications of this method are (1) testing experimental polishing baths, (2) polishing discrete areas of massive or intricately shaped objects to remove a controlled amount of metal, (3) decorative contrast finishing, (4) grain size control of metallurgical processes, and (5) other metallographic polishing. It is useful as an inspection tool in the determination of whether or not carbides have precipitated in austenitic stainless steels since a pitted, gray surface will result if the steel has gone out of its stainless state; if the steel is satisfactory a good polish will be obtained on the areas tested.

In electrolytic lapping, the object is connected as anode and brought into contact with a disc (Fig. 4), which may be rotated, or with rollers connected as cathodes in a

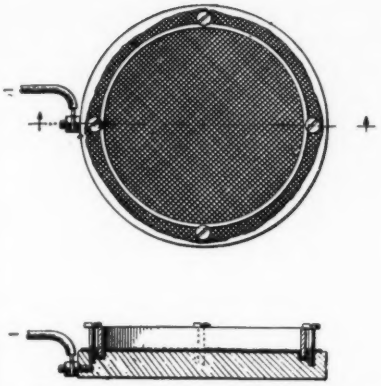

Fig. 4. Disc for electrolytic lapping

circuit and covered with a solution-retentive material wet with the solution. Again, this process requires no temperature control, only a voltage setting for adequate polishing.

Tanks and large volumes of expensive solutions are not needed in these processes. Results are obtained extremely rapidly because of the tremendous current densities reached with the close spacing of anode and cathode. Current densities as high as 1000 to 1500 asf have been measured on microspecimens polished at 7 to 15 volts.

Used originally for grain size inspection of cartridge brass and for testing polishing solutions, this method is very likely to find applications in the finishing of continuous wire and strip, in pattern polishing with die-face cathodes and in the removal of weld oxide from welded seams of otherwise-finished fabricated structures.

Acknowledgment

The author gratefully acknowledges his introduction to the field of electropolishing by Mr. Sam Tour of Sam Tour, Inc., and the assistance in the development of the "brush" methods rendered by the research staff of the Laboratory Division, Frankford Arsenal. He is also indebted to Messrs. Kenneth M. Huston and John F. Kreml, Rustless Iron and Steel Division of the American Rolling Mill Company, for information on that company's commercial process for polishing stainless steel and to Miss Eleanor M. Tafel, Librarian, Laboratory Division, Frankford Arsenal, for assistance in assembling the bibliography.

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✝

Maurice Raymond Thowpson

A pathfinder in the science of electroplating went to his reward when M. R. Thompson, one of the first to use pH measurements in plating baths and inventor of the high-sulfate nickel bath for plating zinc die castings, died in Baltimore, Md., on June 2, 1947.

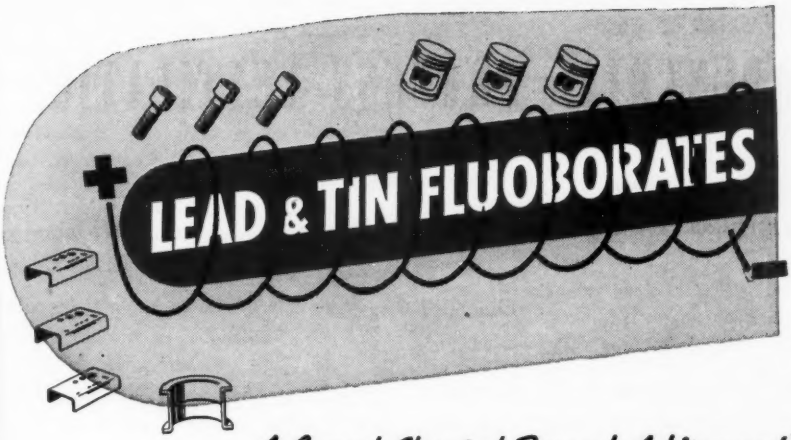
Mr. Thompson was born at Lexington, Mass., on December 5, 1888. Following graduation from M. I. T. in 1911 he was employed as chemist and metallurgist by the National Carbon Company, Chile Exploration Company, General Electric Company and Baltimore Copper Company.

In 1921 he joined the National Bureau of Standards and was for 20 years engaged in researches on electrodeposition of metals. His results were published in numerous contributions to The Monthly Review and the "Transactions of the Electrochemical Society".

In 1941 he joined the staff of the U. S. Bureau of Mines at Norris, Tenn., with which he was connected at the time of his death. Here he worked on the beneficiation of clays and extraction of alumina from clays.

He was an active member of the Baltimore-Washington Branch of the A. E. S. and a member of the Publications Committee and a director of the Electrochemical Society. A soft-spoken and retiring man, Mr. Thompson was highly thought of by his associates and all who came in contact with him.

He is survived by his widow, Mrs. Sophie Howard Thompson, and a daughter, Mrs. Mary Thompson Arthur.



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PRINCIPLES OF INDUSTRIAL PROCESS VENTILATION

WILLIAM N. WITHERIDGE

Ventilation Consultant, General Motors Corporation—Detroit, Michigan

(Continued from July)

LOCAL EXHAUST VENTILATION

Fig. 2 illustrates the fundamental difference between blowing and exhausting devices. Air blown from a small opening retains its directional effect for a considerable distance beyond the plane of the opening. However, if the flow of air through the same opening were reversed so that it operated as an exhaust opening handling the same volume of air, the flow would become almost completely non-directional and its range of influence would be greatly reduced. It is for this reason that local exhaust hoods must not be contemplated for any process which cannot be conducted in the immediate vicinity of the hood.

As indicated under "Successive Ventilation" exhaust hoods not only provide local ventilation but also some general ventilation for the nearby areas.

The air volume requirements for the control of air contaminants by general ventilation are many times greater than the volumes required for controlling the same process by local exhaust hoods. If the exhaust hood becomes nothing more than a device for creating

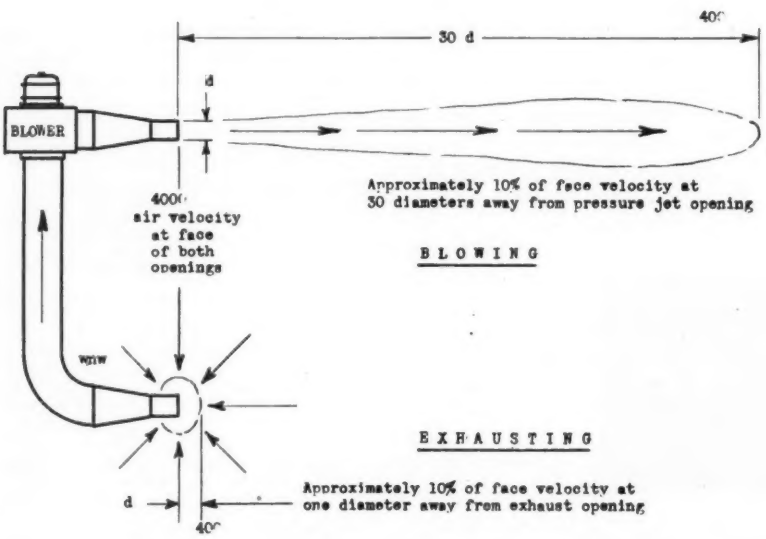

Fig. 2. Airflow characteristics of blowing and exhaust devices

general ventilation in the vicinity of a process conducted beyond the effective range of the hood, the designer's original estimate of the required air flow rate in cubic feet per minute will not be adequate. Furthermore, it would not be economical to increase the air flow rate through such a local exhaust hood to bring it up to general ventilation volumes because the suction power requirements would be exorbitant. General ventilation should be provided by low velocity, low suction devices.

Elements of a Complete Local Supply and Exhaust System

A. Air Supply

1. Air supply openings or inlets through which air enters the building or room in which the local exhaust system is operating; should be carefully located remote from any source of outdoor contamination.

2. Air supply cleaner, in case the outdoor air is dustier than indoor requirements will permit.

3. Supply fan, if distribution by ductwork is necessary.

4. Heating equipment for tempering incoming air during winter.

5. Supply ductwork for distributing incoming air, either generally throughout the space or directly to the exhausted area or equipment.

B. Air Exhaust

1. Exhaust hoods specially designed for capturing or confining the air contaminent before it can disseminate throughout the room or building.

2. Exhaust ductwork or piping for conducting contaminated air outdoors or back to the room after suitable cleaning.

3. Exhaust fan to provide source of suction; rarely can natural draft stacks provide dependable adequate suction for a local exhaust system. If a supply fan is not provided, the exhaust fan must have sufficient power to draw air into the building through inlets available during the heating season when most windows and doors are closed.

4. Air cleaning apparatus to eliminate most of the contaminant from air discharged

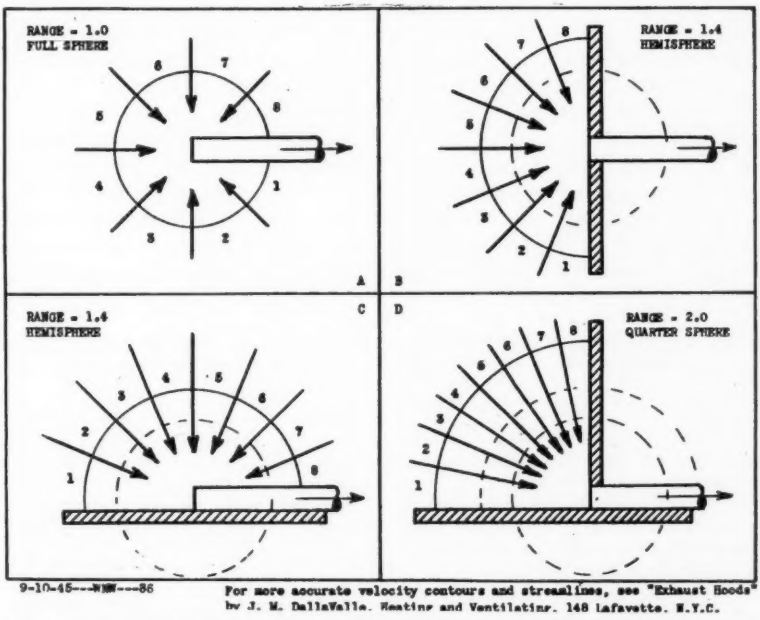

Fig. 3. Flanges and baffles increase the range of exhaust openings. For more accurate velocity contours and streamlines see "Exhaust Hoods" by J. M. Dalla Valle, Heating and Ventilating, 148 Lafayette St., New York City

outdoors or to reduce the concentration to a safe or satisfactory level in case the air is recirculated to the working environment.

5. Disposal of contaminant must be anticipated whether air is recirculated or discharged outdoors; many exhaust systems are installed primarily for the recovery of valuable airborne products or by-products.

6. Air outlet or discharge opening; the stack or wall opening must be property located to minimize neighborhood nuisance or hazard, and to prevent recontamination of plant atmosphere through the air supply openings, windows, doors or monitors.

No local exhaust system should be planned without consideration of the source of "make-up" air to supply that which is removed by the exhaust system. The designer who forgets this or fails to warn his client of it, runs the risk of having his exhaust system condemned for a wintertime failure that is the direct result of closed windows and doors.

Flanges and Baffles Increase the Range of Exhaust Openings

Fig. 3 illustrates the beneficial effect of restricting the direction of airflow into an exhaust opening. The diagrams were constructed on the basis of a point source of exhaust which, of course, does not occur in practice. However, even though the true velocity contours of actual exhaust hoods are not strictly spherical or cylindrical, the error introduced by computing ventilating requirements on the basis of simple spheres, cylinders or planes according to the hood design is usually far less than the error entailed in estimating a successful "capture" or dust control velocity. Such estimates of required capture velocities may easily be 200 or 300 per cent in error if the field conditions are not carefully analyzed. Laboratory studies of capture velocities thus far have not been able to incorporate the highly complex disturbances encountered in most field applications. The ventilation designer must fill in this gap with all the experience and judgment he can command.

Volume and Velocity Characteristics of Unobstructed Exhaust Hoods

Table V presents the relationships between air volumes entering a small exhaust opening and the resulting air velocities at successive distances away from the opening. If the opening is small in relation to the distance from the source of dust or fume, there is no need for "pointing" the exhaust opening toward the source of contaminant. Air flows almost with equal velocity from every direction toward the opening, including points behind as well as in front of the plane of the opening (see diagram A in Fig. 3).

Specifying Local Ventilation

Fig. 4 demonstrates the definition of the term "face velocity," commonly used by ventilating engineers, as the speed of airflow in linear feet per minute (lfm) across the face or plane of any type of opening. It is important in giving exhaust hood specifications to use the terms "linear feet per minute" (lfm) and "cubic feet per minute" (cfm) with care. Ventilation rates may be stated in either form, but the volume expression is (cfm) while (lfm) is the velocity expression and is

TABLE V
AIR QUANTITIES REQUIRED TO CREATE A SPECIFIED "CAPTURE VELOCITY"

Distance (X) from unobstructed exhaust opening to point of specified "capture velocity"	X (feet)	0.5	1.0	1.5	2.0	2.5	3.0
Surface area (A) of sphere representing constant air velocity contours	$A = 4\pi X^2$ (sq. ft.)	3.1	12.6	28.3	50.3	78.6	113
Air velocities (lfm) at specified distance (X) from exhaust opening corresponding to air quantities (cfm) listed at right: $lfm = \frac{cfm}{A}$	cfm	Available "capture velocity" (lfm)					
	250	80	20	9	5	3	2
	500	160	40	18	10	6	4
	1000	320	80	35	20	13	9
	3000	970	240	105	60	38	27
	5000	1600	400	175	100	64	44

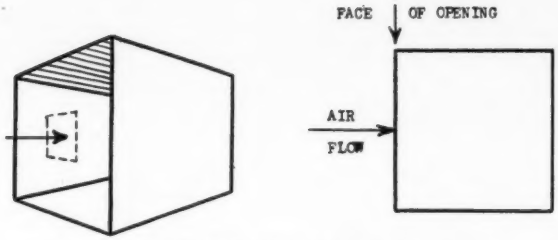

Fig. 4. Definition of face velocity

equal to the (cfm) divided by the area of the face opening.

Two types of local ventilation will serve to illustrate the currently favored methods of estimating ventilation rates.

Canopy Hood Ventilation

Fig. 5 is a diagram of the simple canopy or overhead hood. The following simplified equations are suggested for estimating the correct amounts of ventilation for such hoods:

cfm = 75 D P (when drafts are negligible)
cfm = 100 D P (popular choice of designers)
cfm = 150 D P (in presence of moderate drafts
cfm = 300 D P (near strong, steady drafts)

where cfm = required airflow in cubic feet per minute
D = height of hood edge in feet above the point of air contamination
P = perimeter of hood at lower edge in feet, including only those sides open to the room

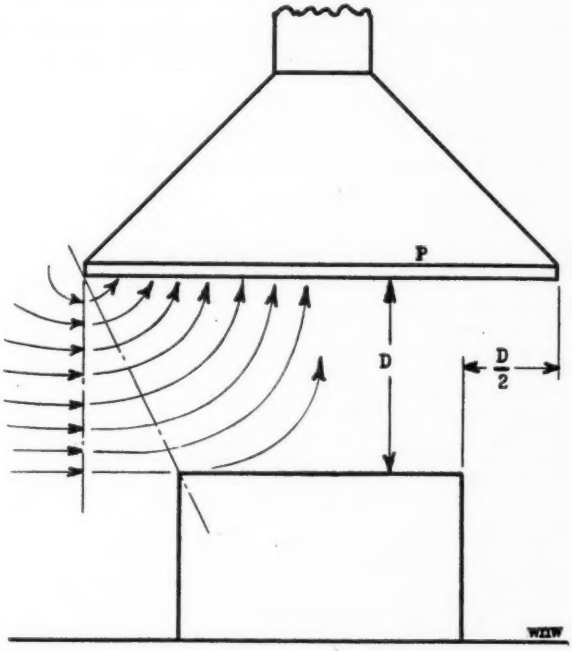

Fig. 5. Canopy hood ventilation

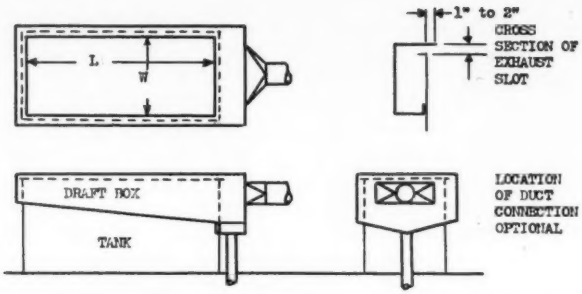

Fig. 6. Tank ventilation. Note that the draft box should slope to permit flushing and that the drain pipe at the lowest end of the draft box should be provided with a water seal or trap adequate to prevent airflow up through the pipe

Although the diagonal dot-dash line in the diagram should be considered the "outer face" of the hood for the purpose of ventilation estimates, the four simple equations given make sufficient allowance for the resulting geometric errors and the air velocity gradient between the hood edge and the ventilated process. In fact, the selection of the proper control velocity factor to place in these or similar equations may be much more difficult than the mathematical estimation of the true face opening for a given canopy hood.

Tank Ventilation

Fig. 6 illustrates the type of ventilation commonly applied to tank processes. Many variations of this method of ventilation are available.

The air velocity into the exhaust slot is determined by the total quantity of air flow required in cubic feet per minute and the size of slot is selected from mechanical considerations.

The minimum practical slot velocity is about 1000 lfm for reasonably uniform distribution of airflow when a single duct

TABLE VI
VENTILATION RATES FOR TANK PROCESSES

PROCESS OR APPLICATION	VELOCITY FACTOR cfm/sq. ft.
Solvent or vapor degreasing (trichloroethylene)	50
Hot water rinsing (nuisance control)	100
Electroplating—Class 1 & II—ASA Code Z9.1–1941	120
Preferred for chromium electroplating Cyanide plating solutions giving off gases or mists Muriatic acid pickling Molten salt baths for heat treating Aluminum anodizing	150
Electrolytic cleaning Hot caustic or alkali cleaning or degreasing Boiling water solutions (steam and mist control)	200
Stripping with concentrated nitric acid Stripping with concentrated nitric—sulfuric acids Hot nitric-hydrofluoric acid pickling Hot sulfuric acid pickling	250

connection is used with slot extending around the tank.

Th maximum practical slot velocity is about 3000 lfm in the interest of power economy, minimum entrainment of mists and agitation of the tank contents. Higher air velocities through very narrow slots may further improve the uniformity of airflow distribution around the tank when the mechanical design of the ductwork is unsatisfactory, but should not be used unless power cost is of no consequence or unlimited exhaust fan capacity is available.

Quantity of airflow required is determined by the equation:

$$cfm = \text{velocity factor} \times L \times W$$

where cfm = total airflow in cubic feet per minute

L = length of tank in feet

W = width of tank in feet

Velocity factors for several processes are suggested in Table VI.

Air Velocity "Spectrum"

Table VII indicates the wide range of air velocities that enter into the design of industrial ventilating equipment. Normal industrial activities make it necessary to consider 50 lfm as "still air" in most plants. This is higher than the commonly accepted value of 15 to 25 lfm for still air conditions in offices, conference rooms and theatres.

TABLE VII
AIR VELOCITY "SPECTRUM"

AIR VELOCITY	CFM
Industrial "still air"	50
Minimum for "capture"	100–200
In natural draft stacks	200–500
Maximum for "capture"	500–1000
For gas and vapor transport	1000–2000
For dust transport	2000–5000
For pneumatic conveying	5000–10000

Air Velocities for the Capture of Air Contaminants

Table VIII gives more detailed information on the selection of "capture" velocities. These are the velocities necessary to counteract the mechanical and thermal disturbances near industrial processes if exhaust hoods are to be successful in preventing the escape of gases, vapors or dusts.

TABLE VIII
RECOMMENDED "CAPTURE" AIR VELOCITY TO PREVENT ESCAPE OF AIR CONTAMINANTS

For local exhaust control of gases, vapors and fumes, and dusts below 10 micron size. Contaminant density ignored on assumption that air concentration is less than 1 per cent. Velocities based on assumption that draft-deflecting baffles cannot be installed. These are not hood face velocities unless process is at or within hood opening.

HORIZONTAL DRAFT CONDITION	"CAPTURE" AIR VELOCITY IN LFM WITH			
	CONTAMINANT AT ROOM TEMPERATURE	CONTAMINANT SEVERAL HUNDRED DEGREES F ABOVE ROOM TEMPERATURE. STRONG THERMAL UPDRAFT		
	ALL HOOD TYPES	UPDRAFT HOOD	SIDEDRAFT HOOD	DOWNDRAFT* HOOD
Negligible (50 lfm)	75	100	200	300
Slight (100 lfm)	150	200	300	400
Moderate (200 lfm)	300	300	400	500
Strong (300 lfm)	400	400	400	500

*Generally an unsatisfactory choice for hot processes

Air Velocities for Transporting Dusty and Granular Materials

Table IX suggests air velocities both for dust collecting and for pneumatic conveying. For transporting of gases and vapors, duct velocities can be as low as consistent with space and weight limitations. Velocities in the range of 1000–2000 lfm for gases and vapors are a compromise between excessive duct size and unnecessarily high air horsepower requirements.

TABLE IX
AIR VELOCITIES FOR TRANSPORTING DUSTY AND GRANULAR MATERIALS

MATERIAL	AIR VELOCITIES IN LFM FOR	
	DUST COLLECTING	PNEUMATIC CONVEYING
General range	2000–5000	4000–9000
Aluminum dust	4500–6000	.....
Asbestos	3000–3500	.....
Ashes, ground	.....	6000–8500
Bakelite molding powder	2500–3500	.....
Barley	.....	5000–6500
Buffing lint	3000–5000	.....
Cast iron dust	4000–5000	.....
Cement, Portland	3500–4000	6000–9000
Clay	3500–4000	.....
Coal, powdered	3000–4000	4000–5500
Cocoa	3000–3500	.....
Coffee beans	.....	3500–5000
Cork, ground	2500–3000	3500–5500
Corn	.....	5000–7000
Cotton	2500–3000	4000–6000
Cotton seed	.....	4000–6000
Flour	2500–3000	3500–6000
Foundry dust	3500–500.)	.....
Grain dust	2000–3000	.....
Granite dust	4000–5000	6000–8000
Grinding dust	3000–5000	.....
Ground feed (½" screen)	.....	4500–6000
Hemp	.....	4500–6000
Hog waste	3500–4500	4500–6500
Jute butts	.....	3500–5000
Jute dust	3000–3500	.....
Jute lint ("flyings")	2500–3000	.....
Lead dust	4000–5000	.....
Leather dust	3000–4000	.....
Lime	3500–4000	5000–7000
Magnesium dust	4500–6000	.....
Metal turnings	4000–5000	5000–8000
Oats	.....	4500–6000
Pulp chips	.....	4500–7000
Rubber dust	2000–4000	.....
Rye	.....	5000–7000
Salt	.....	5500–7500
Sand or silica	3500–4500	6000–9000
Sawdust, light or dry	2000–3000	4000–6000
Sawdust, heavy or wet	3000–5000	.....
Soap dust or powder	3000–3500	.....
Sugar	3000–3500	5000–6000
Tanbark, dry	.....	4500–7000
Tanbark, damp or leached	.....	5500–7500
Wheat	.....	5000–7000
Wood blocks (edgings)	3500–5000	4500–6000
Wood "flour" (sander dust)	2000–2500	4000–6000
Wood fibers	3600–4500	4500–6000

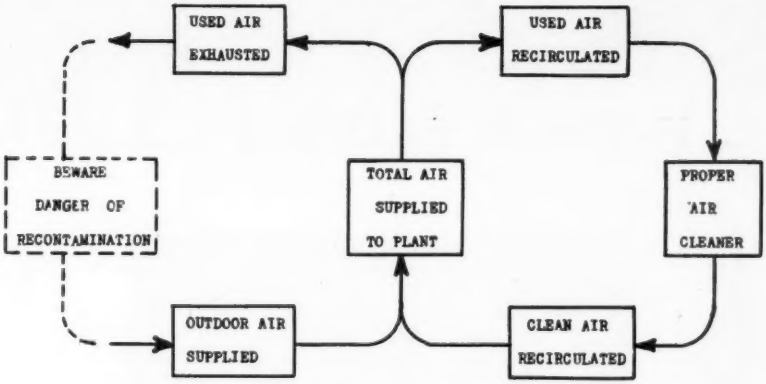

Fig. 7. Recirculation of air

RECIRCULATION OF AIR

In northern sections of the country, considerable interest has developed in air cleaning devices installed to make recirculation of industrial atmospheres a safe and satisfactory procedure. Obviously the great diversity of air contaminants created inside factory buildings makes it necessary to select air cleaners designed for specific jobs. They must be able to remove all but the very small permissible concentrations of dusts, fumes, vapors, mists or gases before the air is suitable for recirculation.

Fig. 7 is self explanatory. At the present time, recirculation can provide only part of the air required inside factories. The proportion of recirculated air in the total air circulation will depend on the quality and type of air cleaner, the degree of air contamination, and the relative hazard of the contaminant from the standpoint of health, fire or explosion. Most regulatory authorities do not permit recirculation until it is definitely proven by test or experience that the air cleaner in question can reduce the contaminants in the discharged air well below their "maximum allowable concentration." Dusts from the grinding of steel or iron products with silicon carbide or aluminum oxide wheels are rated as "nuisance" dusts by most authorities and are successfully retained by many unit dust collectors now on the market. One state is currently studying the operating characteristics of such devices.

The principal objective of air recirculation is the saving in heat made possible by keeping the heated air inside the plant rather than exhausting it directly to the outdoors. Whether this saving is sufficient to justify the expense of air cleaning is a matter for individual analysis.

Educational Films Available

Available from The Dow Chemical Company on a free loan basis are three informative and entertaining movies on magnesium.

The first is *The Working of Magnesium*, a 16 mm sound picture which runs for 27 minutes and portrays various techniques for handling the metal such as machining, forming, arc and spot welding

This is Magnesium is a film of a general nature showing the extraction of the metal and magnesium's vast possibilities as a structural material. Running tme for the 16 mm sound picture is 20 minutes.

A new Walt Disney 16 mm sound cartoon in technicolor is *Treasure from the Sea* which shows the values of the material to industry. This 16-minute cartoon will be sent with *This is Magnesium* unless otherwise specified.

These pictures are available by contacting Millard J. Hooker, Advertising Department, The Dow Chemical Company, Midland, Mich.

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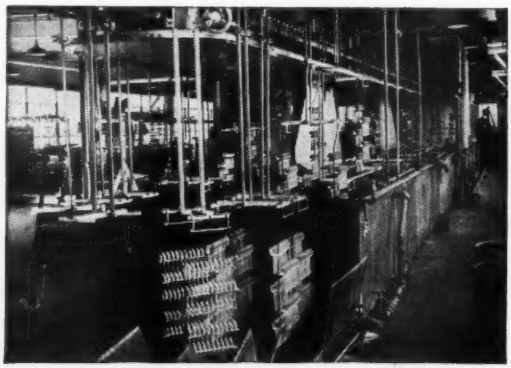
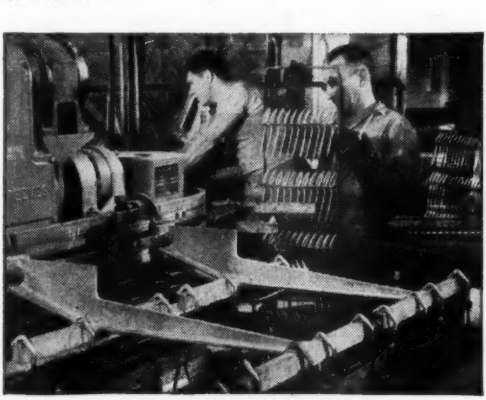


H-VW-M Full Automatic Conveyor in International Silver's 1847 Rogers Bros. plant, Meriden, Conn. Flatware shown during preliminary work of cleaning, rinsing, and the silver "strike," prior to the silverplating operation in adjacent H-VW-M Semi-Automatic Conveyors.



One of three H-VW-M Semi-Automatic Plating Conveyors. This specially built equipment has multiple agitation features which, with scientific control, assure uniform distribution of pure silver. Work is oscillated in three distinct motions—continuous chain travel moves racks of flatware forward, while entire mechanism is given both longitudinal and transverse reciprocating motions.

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New Pontiac Plating Plant

A modern fully automatic plating plant, 660 feet long and 50 feet wide, three-quarters of an acre of continuous plating machines, was recently completed by the Pontiac Motor Division of General Motors Corporation in Pontiac, Mich., and was viewed by many of the visitors to the recent A. E. S. Convention in Detroit. It takes care of practically all of the plating requirements of this manufacturer and handles parts varying from 0.8 to 4.0 square feet of surface.

The plating machines, built by Meaker Manufacturing Company, consist of three sections. The first section for copper plating is 207 feet long and includes fifteen automatic operations requiring 52 minutes to complete the cycle. The main copper-plating tank contains 58,000 gallons of copper plating solution, which is circulating constantly at the rate of 1500 gallons per minute and is filtered at the rate of 1,260 gallons per minute. The circulating system passes through sixteen heat exchangers maintaining a constant predetermined temperature. By means of the pump equipment the entire content of the copper plating tank of 58,000 gallons, can be transferred to an adjacent storage tank in 25 minutes.

The nickel section which is 250 feet long includes fourteen different tanks and operations and requires 64 minutes for a complete cycle. The nickel plating tank contains 67,200 gallons of solution, the equivalent of 8½ tank cars. The nickel plating solution is filtered constantly and heated with 15 heat exchangers.. Part of the circulated volume is passed through an electrolytic purification tank which is connected to a General Electric 2000-ampere, 6-volt rectifier.

The chromium plating section is 139 feet long and includes ten automatic operations. The main chromium tank, which has a capacity of 15,700 gallons, is divided into two compartments, allowing two lanes of work which may be operated at different cathode current densities. The chromium plating solution is circulated through both heat exchangers and coolers to maintain the predetermined temperature.

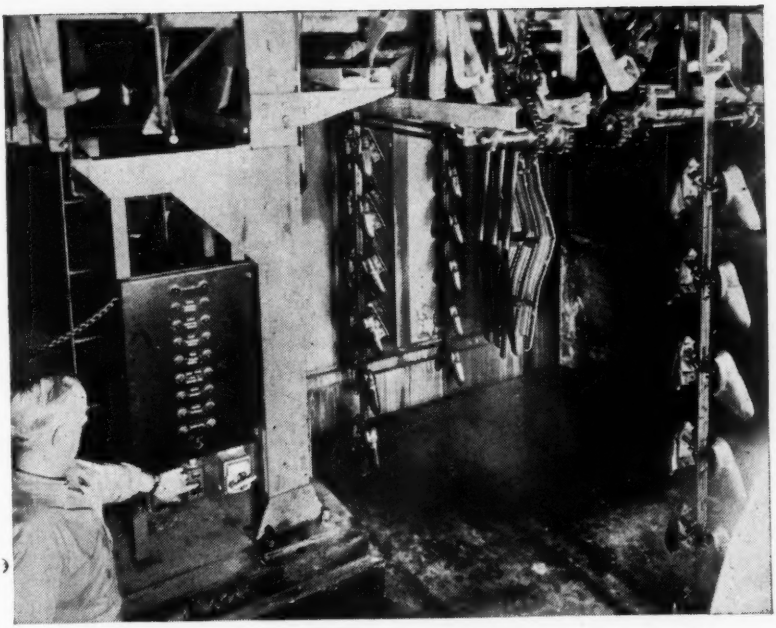
There is a master panel at the starting end of each automatic machine; if the machine is stopped for any reason a light on the master panel indicates at what point the difficulty is; the machine cannot be started again until the light is off and a warning horn has sounded for at least thirty seconds. In addition to this master panel there is a stop cord along the entire length of the automatic machines.

The plating capacity of these automatic plating machines is 22,500 square feet of copper, of nickel, and of chromium—a total area of 67,500 square feet or about an acre and a half of plated surface per eight-hour day.

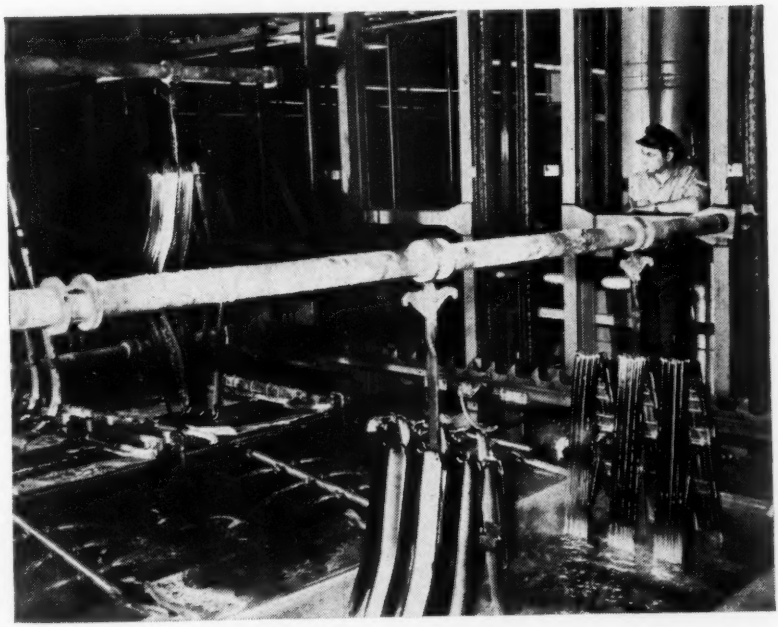
The electrical energy for the operations is supplied from twenty-two Chandeysson motor generator sets ranging in size from 5,000 amperes at 6 volts to 15,000 amperes at 12 volts with a total capacity of 285,000 amperes which, if converted to proper voltage, would be sufficient electric power for 7,000 homes.

Demineralizers with capacity of 3,000 gallons an hour furnish water for the plating tanks and the rinses preceding the plating. The temperatures of the heated solutions and levels on all plating tanks, cleaner tanks, and power wash machines are automatically maintained. All rinse sprays operate intermittently as the work is being raised from the tank by means of remote control switches, relays, and timers. The total capacity of all the tanks on this project is in excess of 500,000 gallons or fifty-five tank cars of solution. Ventilation where required is accomplished by 32 blowers with a total capacity of 434,000 cubic feet per minute.

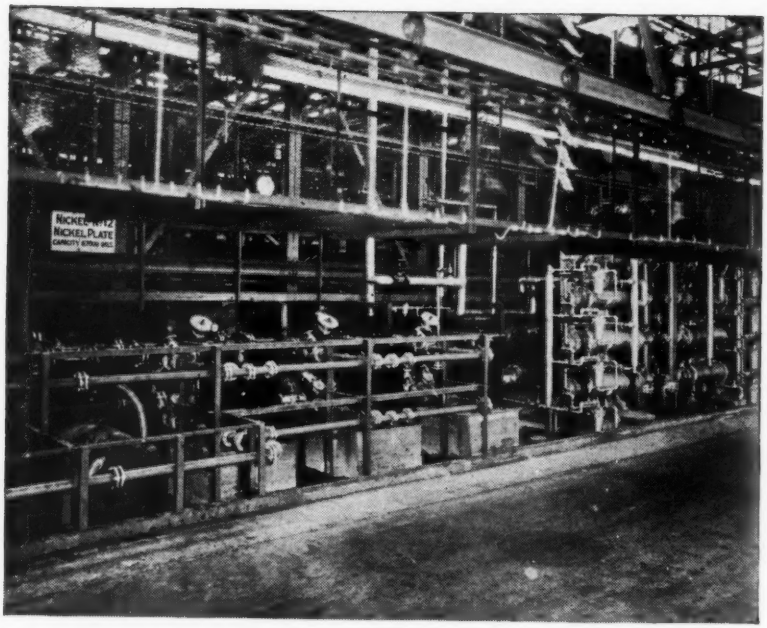
The plant was engineered and installed by the George L. Nankervis Company of Detroit.

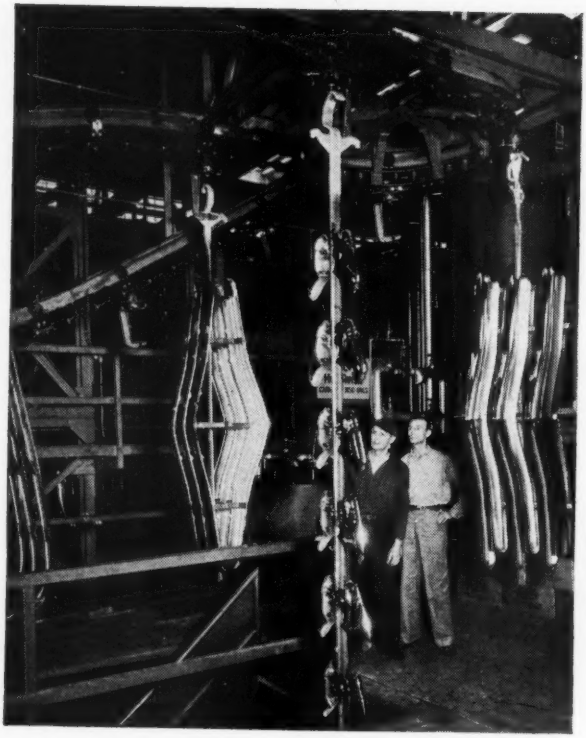


Master panel at the starting end of the copper section



Transfer station on automatic machine viewed from catwalk that runs full length of the machine





Above:

Filtration and heating units by automatic machine

Left:

Overhead transport of racks

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Waste Disposal Investigation

The Research Committee has recently announced the establishment of a new research project on *The Disposal of Plating Room Wastes*. This is the tenth of a series of projects which have been set up as fellowships or grants at leading universities and research institutions throughout the country relating to various practical aspects of the electroplating and metal finishing industry. These projects are supported by allotments from regular membership dues, by voluntary contributions, and by industrial concerns through payment of Sustaining Membership dues to the Society.

Research Project No. 10 has been located at Yale University, with Professor Barnett F. Dodge, Head of the Department of Chemical Engineering, as Project Director and Mr. D. C. Reams, Instructor in Chemical Engineering, as Research Associate. The Project Directing Committee consists of Dr. C. Fred Gurnham, Chemical Engineer, The Whitney Blake Company, New Haven, Conn., Chairman; Mr. Malcolm A. Orr, Electrochemist, The International Silver Company, Meriden, Conn.; and Mr. Manley L. Ross, Manager of Sodium and Cyanide Sales and Development, E. I. du Pont de Nemours & Company, Inc., Niagara Falls, N. Y.

The project currently comprises an extensive survey and critical review of the existing literature in this field. This will be followed by laboratory and pilot plant investigations and by cooperative work in industrial treatment plants. Progress and final reports will be published in THE MONTHLY REVIEW and as A. E. S. Research Reports.

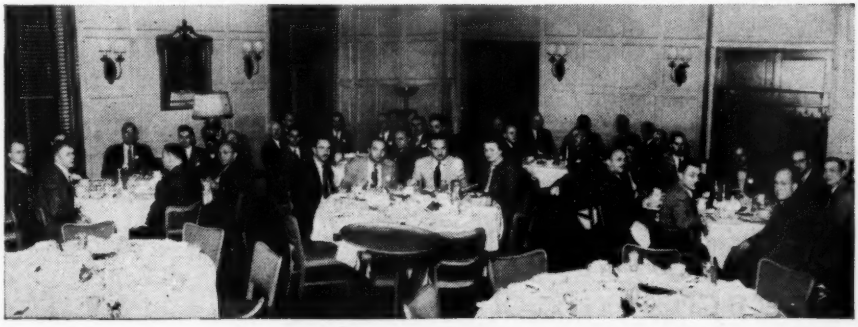
A Note on A. E. S. Research Project No. 2

DETERMINATION OF LEAD IN NICKEL PLATING BATHS

It has been called to the author's attention by Mr. G. B. Bowman that the presence of traces of sulfide in the reagents used in the determination for lead in nickel plating baths will invalidate the results obtained with our method. The sulfide causes precipitation of the lead as lead sulfide and prevents its subsequent extraction and determination with dithiazone.

Commercial cyanide frequently contains small amounts of sulfide which will interfere with the determination for lead. It is advisable, therefore, under all conditions to utilize analytical grade reagents for the determination.

E. J. SERFASS, *Project Director.*



Research Committee's breakfast during the Convention. From left to right: E. T. Candee, C. E. Heussner, M. R. Caldwell, R. M. Wick, K. M. Huston, R. A. Schaefer, A. H. DuRose, L. Weisberg, W. Blum, C. F. Gurnham, A. Brenner, C. H. Sample, C. W. Jennings, H. L. Kellner, F. C. Mathers, B. F. Dodge, L. E. Weeg, H. J. Wiesner, F. K. Savage, F. K. Marquardt, E. Hahn, G. Dubpernell, D. T. Ewing, R. B. Saltonstall, B. C.Case, W. A. Wesley, R. C. Olsen, N. Thon, A. L. Ferguson, S. S. Johnston, G. B. Bowman, D. G. Foulke, H. J. Read, W. M. Tucker, K. G. Soderberg and E. J. Serfass

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Thanks

In addition to the companies listed in the Annual Banquet program, the following companies contributed freely to the success of the Convention. The thanks of the Convention Committee and of the Society are gratefully extended to:

Ford Motor Company
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New Appointments

TO THE RESEARCH COMMITTEE

PRESIDENT HUSTON announces the following appointments to the Research Committee:

MR. M. W. TUCKER, Eastman-Kodak Company, Rochester, N. Y.

MR. B. C. CASE, Hanson-Van Winkle-Munning Company, Detroit, Michigan.

MR. L. WEEG, C. G. Conn, Ltd., Elkhart, Indiana.

These men, who will serve for a three-year period, replace DR. W. A. WESLEY, MR. M. R. CALDWELL and MR. C. E. HEUSSNER who retire after long and extremely fruitful service.

The new chairman of the Research Committee is DR. R. M. WICK who succeeds MR. E. T. CANDEE in this position.

DRS. H. L. KELLNER and R. A. SCHAEFER continue as members of the Finance Sub-Committee; DR. LOUIS WEISBERG is the new Chairman of the Research Directing Sub-Committee, MESSRS. W. M. TUCKER and B. C. CASE and DR. C. F. GURNHAM serving as Vice-Chairmen in charge of groups of projects.

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By DR. HAROLD J. READ
Associate Professor of Metallurgy—The Pennsylvania State College

FUNDAMENTALS OF PLASTICS by Henry M. Richardson and J. Watson Wilson, 1946, VIII + 493 pages. McGraw-Hill Book Company, Inc., 330 W. 42nd Street, New York 18, N. Y. Price, $5.00.

Although this book consists of twenty-two chapters written and edited by a baker's dozen of individuals, it is a compact, well-organized, and extremely informative treatise on the presently popular subject of plastics. The book shows ample evidence of careful planning and well-executed editorial work.

The first chapter comprises a particularly interesting survey of the chemical structure of synthetic resins. It is logical, concise and complete. The only objection which might be offered would be directed against the printing of the structural formulae which, in some cases, are a bit confusing because of the typographical style.

The next three chapters deal in a general way with the application of synthetic resins as materials of construction, the forming and fabrication of plastic articles, and the physical and mechanical properties of plastics. This section provides an adequate background for the detailed treatments of the various types of synthetic resins which are presented in the following chapters.

The extended discussions of the individual resins are grouped into seven classifications: thermosetting resinous condensation products, thermoplastic cellulosic plastics, vinyl polymers and related resins, rubber and the synthetic elastomers, polyesters and polyamides, cross-linked addition polymers, and, finally, silicone resins, rubbers and related products. Here we find further information on the chemical nature of the resins, the raw materials used in their preparation, methods of processing the ingredients, special techniques in fabrication, distinctive properties of the resin, and typical uses.

The fundamentals of plastic product design make up the subject matter of a well-written chapter which is beautifully illustrated. This is followed logically by a section on the manufacture of molds. Here we are provided with a discussion of the principles and problems involved rather than a detailed account of the machining techniques used in the production of a mold, although brief reference is made to machining problems and to some of the special tools employed.

The use of synthetic resins as adhesives and the production of laminated assemblies are dealt with adequately, and there are chapters on compression and transfer molding, injection molding, and extrusion which are replete with useful information, well-chosen examples, and excellent illustrations

The last eighty-four pages of the text are devoted to testing methods and means of controlling quality and uniformity. The approach here, as might be expected, is physical and mechanical rather than chemical. Each of the methods is discussed rather extensively as to the principles involved, the meaning of the test results, and their applicability to the practical use of the material being tested.

Although it might be desirable for the reader to have a background in organic chemistry to make the best use of some parts of this book, any well-read electroplater should not find himself out of his depth.

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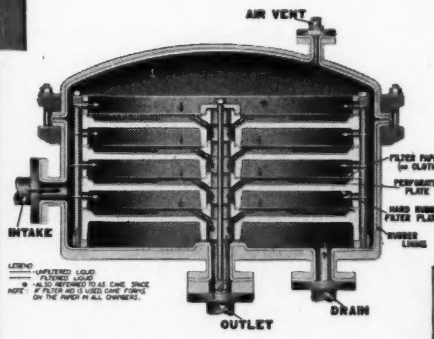

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Flame Sprayed Plastics

MORTON J. GURDIN. *Iron Age* **158,** 64–65 (August 22, 1946).

Application of various plastics by spraying finely ground powder through an oxypropane flame is described. Characteristics of a sprayable thermo-plastic material finding wide use in the plating industry as a tank lining are discussed.

Resin Finishing of Refrigerator Parts

ANON. *Materials and Methods* **24,** 385–388 (August 1946).

Pictorial story of complete process consisting of four stages: zinc electroplating, coating with a phosphate bonding material, dip coats of primer and enamel, and electrostatic detearing.

A New-Time-of-Gassing Test of Thickness of Cadmium Coatings, Particularly for Small Parts

S. G. CLARKE and J. F. ANDREW. *J. Electrodepositors' Tech. Soc.* **22,** 1–7 (1947).

Due to the difference in rate of solution of Westbrook type cadmium deposits in hydrochloric acid-antimony reagent, a new solution has been developed which shows a difference in the rate of solution of only 15 per cent. The solution is 10 g nickel sulfate crystals in 100 ml concentrated hydrochloric acid, sp.gr. 1.16. The method is particularly useful on small parts, such as small nuts, washers, etc. A time vs. thickness graph is presented.

L. B. SPERRY.

Metallization with Aluminum

C. R. DRAPER. *Light Metals* **10,** 124–160 (March, 1947).

An exhaustive review of all the best known methods and equipment for the coating of metallic and non-metallic bases with aluminum. Theory and practice are considered in detail, with particular attention given to the scope and economics of the various fields of applications. The article is illustrated and has a good bibliography.

Anodizing of Aluminum

D. SWARUP and A. P. NAYAR. *Quart. J. Geol. Mining Met. Soc. India* **15,** 119–125 (1943); *Chem. Abstr.* **41,** 2368 (1947).

Experiments are reported with varying concentrations of chromic, sulfuric, and oxalic acids, with and without the addition of other electrolytes. The films produced with sulfuric acid were most satisfactory in appearance, dyed best and had satisfactory resistance to corrosion.

Reflectivities measured on anodized aluminum reflectors were highest for those prepared with an electrolyte containing 25 per cent sodium bisulfate.

Methods of Analysis of Chromium Plating Solutions

F. W. SALT. *J. Electrodepositors' Tech. Soc.* **22**, 15–18 (1947).

Methods of analysis for chromic acid, sulfate, trivalent chromium, and iron are given. Another method, widely recommended, requires four hours for these determinations while with these methods only an hour and a half is required.

L. B. SPERRY.

Apparatus for Anodically Stripping Electrodeposits from One Side of a Sheet for Analytical Purposes

J. W. PRICE. *J. Electrodepositors' Tech. Soc.* **22**, 22–23 (1947).

A method of stripping one side of a sheet cut to disc shape without removing any plate from the opposite side is described. This method is useful when no effective stop-off coating can be found.

L. B. SPERRY.

Aluminum Coated Steel

ANON. *Steel* **120**, 80–81, 102, 104 (March 31, 1947).

A report is presented on the continuous hop-dip process for coating sheet steel with aluminum developed by American Rolling Mill Company. The new material carries the trade name of Aluminized Steel. The various properties are discussed and advantages of the material over bare steel pointed out.

Advancements in Nickel-Dipping Practice

G. H. MCINTYRE. *Am. Ceramic Soc. Bull.* **25**, 333–337 (September 15, 1946).

Stresses importance of acidity and nickel content; pertinent variables in operation, and general effects of nickel treatment in relation to blue ground-coat enamel, particularly white enamel applied directly to steel.

Note on the Effect of Copper on Nickel Deposition

G. E. GARDAM. *J. Electrodepositors' Tech Soc.* **22**, 14 (1947).

The amount of copper which could be present in nickel anodes without causing nodular deposits was found to be 0.13-0.17 per cent.

L. B. SPERRY.

Effect of Small Amounts of Zinc in Watts Type Nickel Depositing Solutions

G. E. GARDAM. *J. Electrodepositors' Tech. Soc.* **22**, 8–13 (1947).

A study has been made of the effect on the plate of small amounts of zinc in Watts type nickel baths of varying *p*H values, including cathode efficiency, hardness, and methods of removal of the zinc.

L. B. SPERRY.

Bright Electroplating and Electropolishing

V. MCWILLIAM CHANDON. *J. Inst. Prodn. Eng.* **25**, 177–189 (1947); *J. Inst. Metals* **14**, 115 (March, 1947).

After a brief account of the ionic theory and of the mechanism of bright electroplating and electropolishing, practical information is given on brighteners for nickel, silver, copper, chromium, and cadmium baths. The electropolishing of stainless steel (by phosphoric or sulfuric acid), nickel and aluminum is described, and the advantages and applications of the electropolishing process outlined.

Enameling Aluminum

ANON. *Foundry Trade J.* **78**, 282 (1946); *J. Amer. Ceramic Soc.* **30**, 62 (March 1, 1947).

Relative to the development of the technique of enameling aluminum, attention is drawn to German medals on a silver base, utilizing low melting point enamels.

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By GEORGE B. HOGABOOM
Consultant, New Britain, Conn.

No. 2,419,722, April 29, 1947—Alloy Anode for Electrodeposition of Zinc—S. P. Love. M. K. T. Reike, C. H. Kent and G. W. Long, assignors to Hudson Bay Mining and Smelting Company, Limited.

CLAIM 1. An alloy anode for use in the electrodeposition of zinc from a zinc sulfate solution, said anode consisting essentially of lead alloyed with small amounts of tin and cobalt and up to one per cent of silver.

CLAIM 4. An alloy anode for use in the electrodeposition of zinc from a zinc sulfate solution, said anode consisting essentially of lead, alloyed with about 0.1 to 0.3 per cent tin, and 0.0005 to 0.03 per cent cobalt.

CLAIM 5. An alloy anode according to Claim 4 containing 0.25 to 1 per cent silver.

No. 2,420,602, May 13, 1947—Electrocleaning Process—R. W. Kingerly, Jr., assignor to E. I. du Pont de Nemours & Company.

CLAIM 7. In a process for employing mineral oil in the cold reduction of steel, the steps comprising applying a lubricant comprising a major amount of a mineral oil which contains from about 0.2 to 0.5 per cent of sulfonated castor oil, from 0.2 to 2 per cent of tricresyl phosphate, and from about 0.1 to 0.3 per cent of Loral phosphate, subjecting the metal to cold-rolling, and then later removing the modified mineral oil by electrocleaning in a silicate detergent solution comprising essentially a sodium silicate having an SiO_2/Na_2O weight ratio from 1.9 to 2.4, the detergent containing a small amount of a non-ionic foaming agent, and the weight ratio of total SiO_2 to total Na_2O in the solution also being in the range from 1.9 to 2.4.

7 Claims.

No. 2,420,291, May 7, 1947—Electrodepositing Copper Upon Steel Wire—O. S. Adler, assignor to National Standard Company.

CLAIM 1. The method of forming a copper clad wire which comprises cleaning a ferrous wire in a hot clean bath of hydrochloric acid having a concentration not substantially less than 20 per cent to produce a silvery white crystalline appearing surface, electrodepositing upon such surface from the cyanide bath a firmly adherent layer of copper, and electrodepositing upon the cyanide copper a firmly adherent layer of copper from an acid bath.

6 Claims.

No. 2,420,377, May 13, 1947—Method of Brightening Tinned Strip—Carl G. Jones.

CLAIM 4. The method of brightening tinned strip which comprises the steps of moving the strip along a substantially ectilinear path (longitudinally in claim 1) while progressively heating it until it attains a temperature of approximately 437° F at a given point on said path, further heating it at a slower rate per unit of travel until at a point farther along said path it attains a temperature between 450° and 485° F, then immediately cooling it in air to a temperature of approximately 437° F, next

quenching it in a liquid maintained at a temperature between 125° and 175° F to a temperature not greater than 322° F, then diverting the strip from said path, and finally removing it from the liquid and further cooling it in the air.

4 Claims.

No. 2,421,027, May 27, 1947—Device for Removing Tarnish from Silver and the Like—H. M. Isaacson.

2 Claims.

CLAIM 1. A device for removing the tarnish from silverware and the like while immersed in an electrolytic bath, comprising a battery, an elongated tubular metal casing for said battery, an electrode projecting from one end of said metal casing, a body of insulating material interposed between said electrode and said one end of said metal casing and closing said one end of said metal casing and exposing a relatively small external area of said electrode, said metal casing having a relatively large exposed external surface to provide a second electrode, the negative terminal of said battery being connected with said first electrode, and means within the casing connecting the positive terminal of said battery with said metal casing, whereby upon immersing said metal casing in said bath and contacting said first electrode with said silverware a circuit is established through said silverware, electrolyte, electrodes and battery with only a small shunt current from said electrodes directly through said electrolyte.

NOTE: Said electrolyte "is a sufficient quantity of salt, washing soda, or other suitable ionizing substance to make the solution electrically conductive."

No. 2,420,403, May 13, 1947—Electrodeposition of Iron—W. B. Stoddard, assignor to The Champion Paper and Fibre Company.

22 Claims.

CLAIM 1. The process of obtaining smooth fine-grained deposits of iron from an electrolytic bath consisting essentially of an aqueous solution of a salt from the class consisting of ferrous chloride and ferrous sulfate which comprises passing an electric current through the bath while maintaining therein, as a catalytic refining agent, at least one-tenth gram and not substantially more than twenty grams per litre of soluble manganese in the form of a divalent salt from the class consisting of manganous chloride and manganous sulfate, the *p*H of the bath being between 1 and 4.5 but not sufficiently high to cause a coarse grain structure of the deposited iron.

EXAMPLE I

Ferrous chloride	84 g/l
Manganous chloride	1.4 g/l
Temperature	206° F
*p*H	1.65–1.85
Current density	100 amp/sq.ft.

EXAMPLE II

Ferrous sulfate	60 g/l
Manganous sulfate	1.2 g/l
Teigitol 7	0.5 g/l
Temperature	185° F
*p*H	3.0
Current density	100 amp/sq.ft.

No. 2,421,265, May 27, 1947—Rapid Zinc Depositing Bath—G. B. Hogaboom, assignor to Hanson-Van Winkle-Munning Company.

5 Claims.

CLAIM 5. An aqueous bath for the electrodeposition of zinc comprising zinc chloride and zinc acetate as substantially the entire electrolyte, the total zinc being within the range of 10.0 to 30.0 oz/gallon, the zinc acetate furnishing from at least 4 per cent to about 20 per cent of the total zinc, the particular quantity within this range being that which with the zinc chloride provides a *p*H value between about 4.2 and 3.8 without the addition of free acid.

Total Metal Content	10 oz/gal	30 oz/gal
Zinc Chloride	16.8 oz/gal	50.4 oz/gal
Zinc Acetate	5.6 oz/gal	16.8 oz/gal
Temperature	120 to 125° F	
Current density	450 amps/sq.ft.	
*p*H	2.8–5.6	

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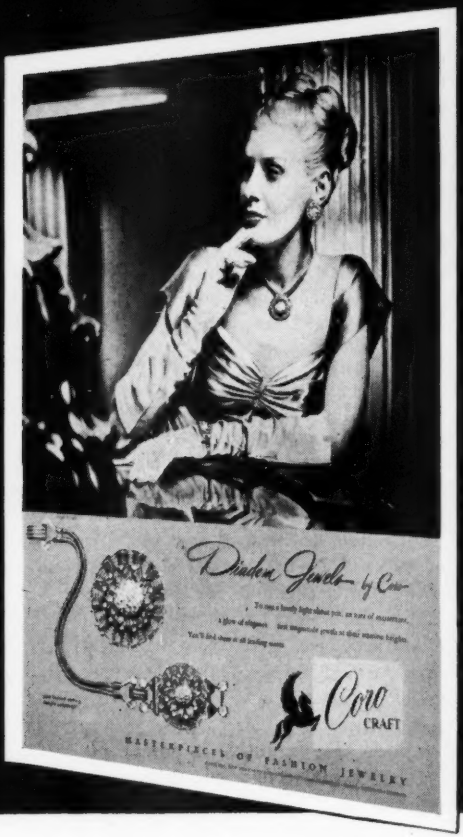

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BRANCH NEWS

COMING EVENTS

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Served at 5:30 P. M.

Price $2.50 per person by reservation only

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BUFFALO BRANCH

The Buffalo Branch is planning to have a really enjoyable picnic. The date is Saturday, August 23, 1947, the place Celeron Park at Chautauqua Lake (near Jamestown). Adult tickets, $3.50; children, $1.00.

The festivities will begin at 1:00 P. M., rain or shine. Sports and games for all are being planned, including a fast ball game between:

THE ROCHESTER GIANTS

versus

THE BUFFALO SLUGGERS

There will be an abundance of refreshments and a really fine chicken dinner. This is Buffalo Branch's first postwar picnic and it's going to be a honey. Yours for a truly merry time,

JOSEPH RUFF, *Secretary.*

BRIDGEPORT BRANCH

PRESIDENT F. B. GOTTHARDT opened the June 6 meeting with forty-four members and guests present.

EUGENE PHILLIPS, Chairman of the Outing Committee, reported that an Outing will be held on August 23 on the estate of William A. Ehrencrona in Trumbull, Conn. Postals with returns are to be sent to members to find out how many will attend.

The Sick Committee reported with regret that PHILLIP WILLETT, one of our oldest members in point of years and service, has passed away recently.

Ten applicants were elected to memberships. Two members, no longer connected with the plating industry, resigned; two were suspended for non-payment of dues.

B. F. KUSTERER, wishing to resign after a long service and membership in the Society, was unanimously elected as an Honorary Member of the Bridgeport Branch instead.

LIBRARIAN ANTHONY J. CHENIS brought out some interesting points about plating solutions which led to a general discussion.

JOSEPH G. STERLING,
Secretary-Treasurer.

CHICAGO BRANCH

About eighty-five members and guests were present at the regular meeting of June 13.

Mr. C. W. Carter of United Chromium Incorporated delivered a very good paper on hard chromium plating. It covered preparation of the basis metal, construction of anodes and cathodes, as well as conditions of plating for various applications. Complete procedures for plating machine tools under optimum conditions were given.

Many questions, denoting the general interest in this subject, appeared in the Question Box.

J. H. Monaweck, *Librarian.*

COLUMBUS BRANCH

The quality of Mr. J. Homer Winkler's, of Battelle Memorial Institute, talk at the June meeting met a high standard and his method of presentation held the attention of the group for the entire period. The talk was educational and amusing. His description of how the use of a vinyl plastic impression for electrotypes cleaned up the industry and its personnel and improved customer relations by eliminating graphitizing wax was truly a classic.

To make it electrically conductive, the vinyl plastic impression is sensitized and chemically coated with silver, a very clean and fast operation with a double nozzle spray gun which simultaneously sprays a silver solution and a reducing solution. A silver coating forms where these solutions mix on the sensitized surface of the plastic.

A. B. Tripler, Jr., *Reporter.*

INDIANAPOLIS BRANCH

A special meeting was held on Wednesday, June 4, to determine the members' desires in regard to the proposed revision of the Constitution and By-Laws.

It was agreed that the proposed Constitution on the whole was far better than the present one. A motion was made by Dr. A. M. Max and carried instructing the delegates to vote for its adoption with the request that they try to incorporate into it the provision that new members be automatically assigned to the local Branch in their area.

J. Monagle, *Secretary-Treasurer.*

LOS ANGELES BRANCH

The Los Angeles Branch held its regular meeting on June 11, 1947, at Scully's, 4801 Crenshaw Avenue. The move from more central metropolitan meeting places was motivated by a need for better food at lower prices. Approximately seventy persons attended.

William A. Vensel of the Southworth Company spoke on "Design, Installation, and Operation of Metal Degreasing Equipment Using Chlorinated Solvents." The second educational feature was a twenty-minute sound film, *Date Line Tomorrow*, provided through the courtesy of the Aluminum Company of America.

Six applicants were elected to membership and initiated.

The Employment Committee was reestablished and will consist of the following members: Dean Williams, Chairman; Howard Woodward, D. N. Eldred, Ed Wells, John McDonald, John Millhorn, Harold Kroesche, Jack Hodge, Louis Shoals, and Tom Foster.

Earl Coffin, reporting for the Constitution Committee on the latest proposed revision of the Constitution, indicated that it felt that more time should be allowed the Branches for consideration. The delegates were instructed to oppose adoption of the new Constitution at the present time.

John Merigold resigned as Chairman of the Picnic Committee and Jack Beall, recently returned from a long absence, was selected to fill the breach.

It was voted to purchase the public address system secured by Roy Lostutter for trial.

Dean D. Williams, *Secretary.*

NEW HAVEN BRANCH

Dr. Roy E. Heath and his associates of Wyandotte Chemical Corporation were guests of New Haven Branch on April 8.

Dr. Heath spoke on "Cleaners and Cleaning for Electroplating" giving the members

a complete picture of this important step in metal finishing. The speaker is well qualified to speak on this topic through his own personal experience and that of his company.

The question period proved most interesting, the members being encouraged by Dr. Heath's genial personality and his generous response to their questions.

B. J. GAFFNEY, *Secretary-Treasurer.*

NEW HAVEN BRANCH

PRESIDENT JOSEPH M. COOKE opened the monthly meeting on May 13, 1947.

The sick committee reported the continued sickness of BILL BRIDGETT; a fund was voted on to help his rapid recovery. H. L. KELLNER was congratulated on his chairmanship of a successful New England Regional Convention. A special "Constitution" meeting was voted to be held on May 27 for open discussion on this subject.

The following officers were elected for the coming year:

President—EDGAR W. LUTHER
Vice-President—C. FRED GURNHAM
Secretary-Treasurer—BERNARD J. GAFFNEY
Librarian—HENRY B. SMITH
Assistant Librarian—MALCOLM A. ORR
Board of Governors—CLARENCE GARNER, JOSEPH M. COOKE and HENRY L. KELLNER.

The Delegates to the Convention were CLARENCE GARDNER, JOSEPH M. COOKE and DR. HENRY L. KELLNER with GEORGE G. KNECHT, HENRY J. CREAMER and JOSEPH P. SEXTON as alternates.

GEORGE G. KNECHT, Chairman of the Branch Research Committee reported thirteen sustaining members.

DR. H. L. KELLNER, Lea Mfg. Company, a member of the New Haven Branch, spoke on "Spray Buffing". He demonstrated his talk with a miniature buffing lathe. A lively question period was led by AL ROSENTHAL of Underwood-Fisher Company.

B. J. GAFFNEY, *Secretary-Treasurer.*

NEW YORK BRANCH

Five new applications for membership were received and four new members were elected at the regular meeting on May 23.

MR. MILTON NADEL, a member of the New York Branch, delivered a paper entitled "Aluminum Finishes". It included a discussion of commercial finishes applied to aluminum prior to painting and plating. A lively discussion followed pertaining particularly to plating on aluminum.

ALBERT G. FUSCO, *Recording Secretary.*

SAN FRANCISCO BRANCH

Fifteen members and five guests attended the regular meeting held at the El Curtola Restaurant in Oakland on June 19.

Since it had been impossible to obtain a speaker due to conflict in plans, LIBRARIAN FRANK CAVALLERA had suggested that the members bring their questions for a Question Box period. The resulting exchange of ideas proved to be interesting, especially with FRED HUNTINGTON being called upon to answer many of the questions pertaining to plating procedure.

During the course of the evening, the members were entertained by several selections played by JULIAN LE SIRE on his accordion.

JACK HITE, *Secretary-Treasurer.*

SYDNEY BRANCH

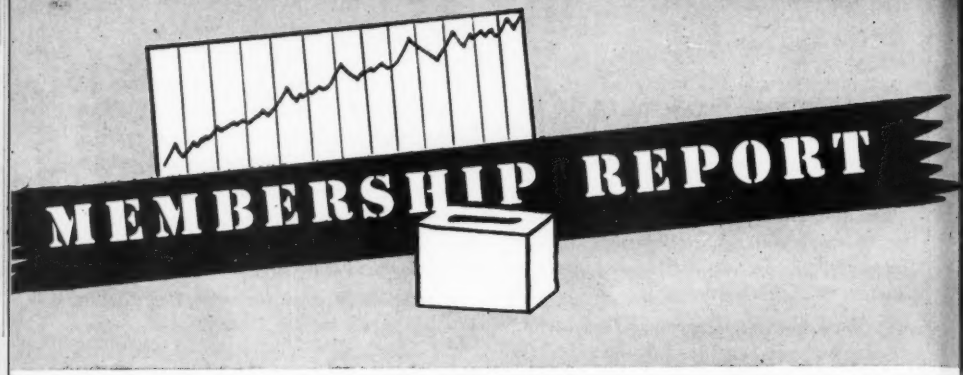
The thirty-fifth regular meeting held on May 13 at the Chamber of Manufactures, was attended by thirty-four members and visitors.

Six new members were elected and one was reinstated.

MR. W. W. PATERSON, JR., gave an interesting talk on "Impurities in Electroplating Solutions". Considerable discussion followed.

After the Question Box had been presented by LIBRARIAN W. MILLWARD, the new Constitution was discussed. Owing to the difficulties of obtaining Dollar exchange, the Secretary was instructed to write to the Executive Secretary and explain the trouble foreign Branches would encounter if individual dues would have to be forwarded to the Executive Secretary.

J. R. GODFREY, *Secretary.*



ARTHUR W. LOGOZZO

Chairman, Membership Committee

ELECTIONS

ADELAIDE BRANCH
- Robert W. Burley
- Bruce L. Cheesman
- Ronald B. Church
- Charles J. Cocks
- Colin C. Drewer
- Alexander L. Harris
- Ronald J. Hodson
- William J. Platten
- F. J. Power
- W. C. Walkley
- H. W. Weepers
- Ivor W. Wiles
- Ernest C. Williams
- Edwin J. Woodcock

BUFFALO BRANCH
- Alma T. Briggs

CHICAGO BRANCH
- Joseph K. Bavuso
- John Squardo

CLEVELAND BRANCH
- Clarence Ballash
- Raymond W. Grace
- John D. Little
- Charles A. Masek
- Charles McGarrity

COLUMBUS BRANCH
- Robert C. Althoff
- Nathan L. Koslin

INDIANAPOLIS BRANCH
- Joseph W. Fox

LOS ANGELES BRANCH
- Glenwood J. Beckwith
- Don F. Edwards
- Alex Endemano
- Charles Green
- Gus Masuth
- C. Sterling Pratt

NEW YORK BRANCH
- Alfred S. Cummin

SYDNEY BRANCH
- Patrick Evans
- A. T. H. Gunton
- C. G. Hunt
- C. E. Lambert
- I. G. T. Maddams
- J. E. Ryan

TORONTO BRANCH
- Thomas W. Jackson

REINSTATEMENTS

NEWARK BRANCH
- John W. Dobson

SYDNEY BRANCH
- K. Charles

TRANSFER

Norman Brewerton from Newark Branch to Pittsburgh Branch.

RESIGNATIONS

ADELAIDE BRANCH
- Clarence H. Scrutton

BALTIMORE-WASHINGTON BRANCH
- Jules Horelick
- Joseph H. Mitchell

CLEVELAND BRANCH
- Stanley J. Atma
- Frederick G. Barker, Jr.

ROCHESTER BRANCH
- C. Lombardo

DEATH

JACKSON-LANSING BRANCH
- Jack Garbry

MEMBERSHIP CHART

BRANCH	Membership May 1, 1947	New Members	Net Change in Membership	Per Cent Net Change
FIRST GROUP				
CHICAGO	410	14	+14	+ 3.4
BRIDGEPORT	147	10	+ 5	+ 3.4
CLEVELAND	194	9	+ 4½	+ 2.3
LOS ANGELES	196	6	+ 4½	+ 2.3
TORONTO	144	2	+ ½	+ 0.3
GRAND RAPIDS	136	..	.....	.....
WATERBURY	139	1	.....	.....
BOSTON	160	..	.....	.....
HARTFORD	141	1	— ½	— 0.4
PHILADELPHIA	218	5	— 4½	— 2.1
NEW YORK	259	7	— 6½	— 2.5
NEWARK	257	6	—13½	— 5.3
DETROIT	423	11	—33½	— 7.9
SECOND GROUP				
PITTSBURGH	126	10	+ 6½	+ 5.1
BUFFALO	98	3	+ 2½	+ 2.5
ROCHESTER	88	2	+ 2	+ 2.3
ST. JOSEPH VALLEY	88	3	+ 2	+ 2.3
SAN FRANCISCO	77	1	+ 1	+ 1.3
TWIN CITY	95	1	+ 1	+ 1.1
MILWAUKEE	124	3	+ ½	+ 0.4
ST. LOUIS	96	..	.....	.....
NEW HAVEN	114	..	.....	.....
PROV.-ATTLEBORO	126	..	— 1	— 0.8
DAYTON	90	1	— 2	— 2.2
BALTIMORE-WASH	119	2	— 7	— 5.9
INDIANAPOLIS	103	16	—12½	—12.1
THIRD GROUP				
ADELAIDE	49	14	+13	+26.5
SYDNEY	59	6	+ 7	+11.9
COLUMBUS	35	4	+ 2	+ 5.7
TOLEDO	55	3	+ 3	+ 5.5
SPRINGFIELD	73	4	+ 3	+ 4.1
LANCASTER	38	2	+ 1	+ 2.6
SYRACUSE	73	..	+ ½	+ 0.7
SOUTHEASTERN	43	..	.....	.....
MONTREAL	60	..	.....	.....
MELBOURNE	61	..	.....	.....
ROCKFORD	64	..	.....	.....
CINCINNATI	52	2	— 1	— 1.9
JACKSON-LANSING	49	..	— 1	— 2.0
TOTAL A. E. S.	4,879	149	— 7	— 0.2

Membership, July 10, 1947 4,872

Check the Outstanding Advantages of

MEAKER

Full Automatic Plating Machines

STRAIGHT-A-WAY RETURN TYPE

1. Economy of Operation

. . . all heavy, tiresome, messy work is done by the machine.

2. Better Quality

. . . close coupled processing sequence readily lends itself to more careful supervision and control.

3. Maximum Output

. . . heavy duty and carefully engineered design insures uninterrupted production schedule.

★

MEAKER PROCESS GALVANIZING LINES
For
Strip Steel **Round Wire**

★

SEMI-AUTOMATIC PLATING MACHINE

THE MEAKER COMPANY

1629–41 South 55th Avenue
Chicago 50, Illinois

INDUSTRY NEWS

New Precision Stop-off

Fine hairline demarcation in masking parts prior to selective plating is now possible through use of *Miccrostop*, a stop-off lacquer just developed by the laboratories of *Michigan Chrome and Chemical Company*.

Miccrostop was developed from new synthetic resins and has adhesive qualities that hold to a fine degree of accuracy through boiling cleaners, acid rinses, and all selective plating cycles. It can be applied by brush, dip or spray and is easily removed after plating. Miccrostop has good dielectric strength, resulting in hair line demarcation with no loss of current. It eliminates the possibility of a lacquer etch on precision-lapped finishes. It possesses rapid air-drying qualities reducing drying time between coats and in preparation for racking. Absolutely neutral, it will not contaminate any plating solution and can be used through all plating cycles including high-speed copper, decorative chrome, phosphate coatings, alloy solutions, zinc, tin, gold, silver, nickel, cadmium, gold on silver, or silver on gold.

Samples are available without cost or obligation by writing Michigan Chrome and Chemical Company, 6340 E. Jefferson Avenue, Detroit 7, Mich.

Lupomatic Industries Inc., Organized

Lupomatic Industries, Inc., has been organized to take over the operations of the former Lupomatic Tumbling Machine Company, Inc., which was established in 1906. *Charles W. Yerger*, well known for many years in the plating and finishing field, is President and Treasurer. *Joseph Lupo*, who continues with the company as Vice-President, will have charge of development and research. *E. F. Helwig* is Secretary. The offices and plant will remain at 4501 Bullard Avenue, the Bronx, New York, N. Y.

The new firm plans an extensive expansion program with the introduction of new engineering features to improve and round out its line of equipment and supplies. It will continue to specialize in barrels for finishing and polishing, tumbling compounds and processes for the finishing of metals and plastics through tumbling. The expansion program includes the establishment of distributorships throughout the country and an efficient administrative organization at the factory to improve service to the industry.

New High Precision Source-Unit for Spectrochemical Analysis

Applied Research Laboratories, 7707 Michigan Avenue, Detroit 10, Mich., have just placed on the market a new *Source Unit* which has been designed specifically for high quantitative precision and accuracy, and which has been tested by the latest direct-reading, photo-electric instrument, the quantometer. The unit provides two basic spectrum sources—one of high voltage and frequency used for the higher percentage determinations, and one of low voltage and frequency used for lower percentage analyses.

WANTED

High calibre man experienced in precision plating with fluoborate solutions.

Send replies to MR-8A, The Monthly Review P. O. Box 168, Jenkintown, Pa.

In spectrochemical analysis an electrical discharge provided by a Source Unit is passed between an electrode and the sample to be analyzed. This discharge vaporizes a portion of the sample and excites the spectrum of most of the elements present. This spectrum is analyzed with spectrographic instruments to provide both qualitative and quantitative analyses of the various elements. The quantitative accuracy obtainable depends largely on the reproducibility and control of the discharge.

Literature describing the instrument in detail is now available.

Karry with Division Lead Company

The Division Lead Company, manufacturer of *Divco 71-Point Lead Anodes*, announces the appointment of *William E. Karry* as Director of Methods and Procedures. His duties will be mainly centered in the promotion of the Divco 71-Point Lead Anodes for chrome plating, electro-stripping, cleaning and electropolishing. He is the head of an experienced technical staff which is prepared to give every assistance in solving metal finishing and surface preparation problems.

Other Division Lead Company products include lead lined tanks, lead steam coils and all other custom-built lead-fabricated equipment. In addition, a number of specialized chemicals for metal cleaning and processing are marketed under the "Tabby" trademark.

Howard L. Wright Transferred

Howard L. Wright, who joined the *Hanson-Van Winkle-Munning Company* about a year ago, after graduation from Franklin and Marshall College and a period of service as a Lieutenant in the Navy, has now been transferred from Philadelphia to the Syracuse Office and is making his headquarters at 313 Baker Avenue, Syracuse 5, N. Y.

Helps for the Electrotyper and the Electroplater

A new series of five folders issued by *Metallurgical Products Company*, Philadelphia 45, Pa., is sent free to anyone interested in this field. Subjects considered are: *Problems Encountered in Electro Forming*, *Analysis of Copper Sulphate*, *Volumetric Analysis of Copper*, *Concentration in Acid Copper Baths*, and *Chemical Calculations*. An additional five folders are in preparation; upon publication they will be offered free upon inquiry.

Brown Instrument To Continue on a Firm Price Basis

Despite steadily increasing labor and material costs *Brown Instrument Company*, Philadelphia, will continue to operate on a firm price basis in the sale of all its products, it was announced by *L. M. Morley*, vice-president and general sales manager of the company.

Northwest Chemical Company Plans To Increase Floor Space

"Preparing for the time when materials will again be available in quantities to satisfy demand," says *H. J. McCracken*, president of *Northwest Chemical Company*, 9310 Roselawn, Detroit 4, Mich., "we have set up a building program that, when completed, will increase our floor space area 33⅓ per cent. We first bought our present plant in 1942, doubled its size in 1944, and now with this latest addition, which will be equipped with special machinery built to our design for the compounding of *Superdraw* formulae, it will also provide us with facilities to take care of several new products that have come into great demand."

...AND LIKE IT

"Practice what you preach" is an adage that has proved its worth at Pennsalt . . . especially at our Michigan works.

DOWNTIME SLASHED FROM 10 DAYS TO 10 HOURS!

At this plant, boiler descaling was previously done by mechanical turbining, involving shutdowns of ten days or more while the unit was being dismantled. A new method—built around our own Pennsalt PM-90 Descaling Compound—completed the entire job in *less than ten hours!* Descaling was more thorough than ever . . . in fact, Pennsalt PM-90 cleaned out pockets probably never cleaned before!

SEND FOR DETAILED REPORT ON THIS CASE!

If you are interested in technical facts on this case, write to address below for Case Report No. 66-8 which contains complete details. And if you have a problem in metal cleaning, plating, enamelling or corrosion-proof construction, call in one of our representatives and let him add our experience to your own.

PENN SALT

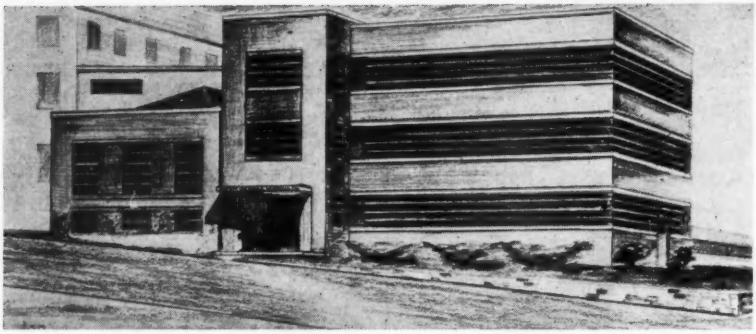
CHEMICALS

97 Years of Service to Industry

PENNSYLVANIA SALT MANUFACTURING COMPANY

Special Chemicals Division, 1000 Widener Building, Philadelphia 7, Pa.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • WYANDOTTE • TACOMA



New Research Laboratory and Test Plant of Hanson-Van Winkle-Munning Company at Matawan, N. J.

A new *Research Laboratory and Test Plant* (above) is being erected by *Hanson-Van Winkle-Munning Company* in Matawan, N. J. The new building will incorporate an ideal environment and every facility for conducting research and development of the Company's products. The laboratory will further provide for experimental and test plant operations to establish each customer's specific requirements in equipment and supplies.

The new building, connecting with the present laboratory, will be approximately 50 x 70 feet, three stories in height and constructed of steel framing with buff colored brick walls and continuous window bands around the major perimeter of the building. The floors will be reinforced concrete with various finishes of brick, asphalt, tile, etc., required to meet special conditions. Heating will be supplied by both direct radiation and a filtered air-forced ventilating system. Lighting will be provided generally by fluorescent lights with intensities varied to suit the requirements of each area.

The main entrance and lobby of the laboratory will house an exhibition of samples and working models of equipment supplied by the company. An office adjacent to the lobby will be provided for the use of engineers and representatives of customers who are visiting or working at the laboratory.

A large area on the first floor of the building will be devoted to the most advanced equipment and facilities for research and experimentation in plating processes of all kinds. Additional laboratories on the first floor will include one for the preparation of special solutions, an enamel and coatings laboratory, a buffing and polishing section and a corrosion testing laboratory.

The second floor will have the offices for the Director of Research and the laboratory staff, a large combination library and conference room, chemical research laboratories, a metallographic laboratory, dark rooms, a balance room and supply rooms.

The third floor will be arranged for a suite of offices for the executive officers of the company, a Board of Directors' Room and a conference room. Additional offices will also be provided on the third floor for the laboratory, engineering and clerical personnel. The main corridor lobby of the third floor will be connected to the main office building of the company by an enclosed bridge, providing for convenient connection between the laboratory and all other departments of the plant.

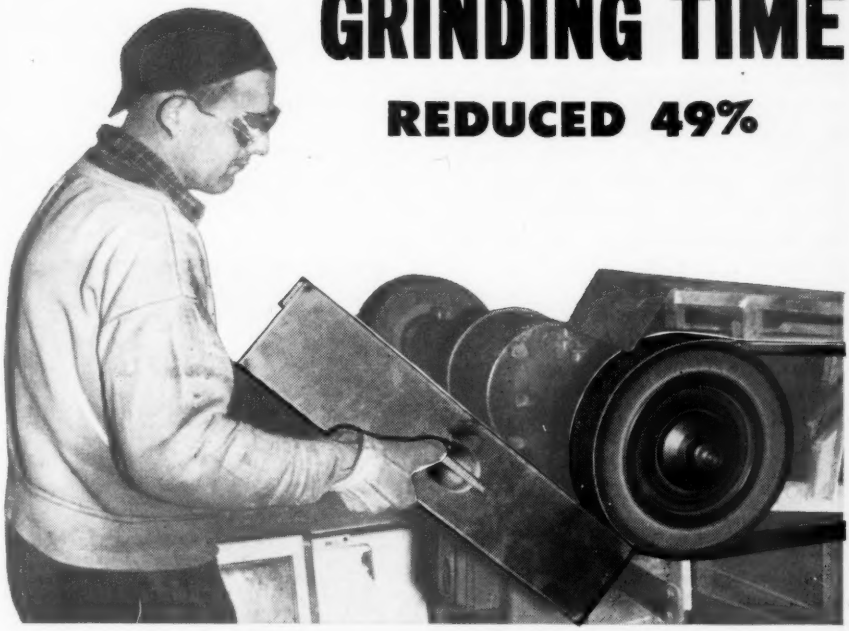
Singmaster & Breyer, Consulting Chemical and Metallurgical Engineers of New York City are the engineers and designers of the building. It is expected that the new laboratory will be completed by the end of the year.

New Bonderizing Catalogue

Bonderizing, the treatment for metals which preserves fine finishes by anchoring the paint and retarding corrosion, is described in a new booklet now ready for distribution.

The new catalog contains much new information about the Bonderizing process and

GRINDING TIME
REDUCED 49%



A leading manufacturer of metal kitchen cabinets has found, in 3M Backstand Belts and 3M Contact Wheels, a way to cut grinding and finishing time in half. Corner welds and seams are given a smoother, cleaner finish in a fraction of the time—and at a fraction of the cost—required by other methods. For complete information on the 3M Method of Grinding and Finishing, see your distributor of 3M Abrasive Products or mail the coupon below for our new "Step Up Production" booklet.

3M
BACKSTAND BELTS

Made in U.S.A. by
MINNESOTA MINING & MFG. CO.
THE 3M COMPANY
Saint Paul 6, Minn.

MR 747
MINNESOTA MINING & MANUFACTURING COMPANY
Saint Paul 6, Minnesota

Please send us a copy of your new booklet describing the 3M Backstand Method of Grinding and Finishing.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

its applications on steel, aluminum zinc, and their alloys, on die castings, and about Bonderite as an aid in deep drawing of steel and aluminum.

The 44-page catalogue is profusely illustrated, including pictures of test panels showing accelerated and weathering tests on various treated and untreated metals. Typical Bonderizing installations are shown, with discussions of most efficient use for various types of production. Write to *Parker Rust Proof Company*, 2177 E. Milwaukee, Detroit 11, Mich., for more information.

New Automatic Electronic Voltage Regulator

Maximum production efficiency and quality performance requires that any preselected DC output voltage be maintained at a constant level. This new *Automatic Voltage Regulator* maintains this constant DC output voltage regardless of the ampere load current.

The Voltage Regulator has maximum regulation sensitivity. At any pre-set voltage, a voltage change of plus or minus 1/10 to 1/4 of a volt will cause instantaneous control reaction.

Features include a voltage selector preset switch, pilot light that shows changing loads, low power consumption; no maintenance, compact, easily handled unit.

The equipment is designed for 115 volt, single phase, 50/60 cycles AC input; standard model is for 1 to 9 volt DC output. Models can be designed to meet any specifications for any line voltage and frequency.

Dimension: 18 inches high, 14 inches wide, 12 inches deep.

The manufacturer is *Richardson-Allen Corporation*, 15 W. 20th Street, New York 11, N. Y.

New Bristol Catalog on Time Cycle Controllers

The Bristol Company, Waterbury, Conn., has just published a 12-page bulletin, *No. C305*, on its new line of *Model C500 Impulse-Sequence Time Cycle Controllers*. The bulletin gives detailed information about the newly developed Model C500 Cycle Controller for tire presses, plastic molds, and general process operations. The booklet is liberally illustrated with line drawings to show principle of operation and method of use on typical plant processes.

A copy of this new catalog may be obtained upon request.

New Research Chemist for Enthone, Inc.

Dr. Walter Meyer, President of *Enthone, Inc.*, has announced the appointment of *Hubert M. Goldman* as Research Chemist.

Mr. Goldman received his B.S.E. in Chemical Engineering from The College of Engineering at the University of Michigan in February, 1938. He was employed at the Norma-Hoffmann Bearings Corporation of Stamford, Conn., from 1938 to 1945 as Research Chemical Engineer and Plating Supervisor. During 1945 and 1946, he was employed as Technical Director at the Connecticut Metal Finishing Company, Hamden, Conn. He has been actively engaged since 1939 in practical electroplating and electroplating research with particular emphasis on hard chromium plating.

He is Past-President and member of the Board of Managers of the Bridgeport Branch of the American Electroplaters' Society, member of American Chemical Society, Electrochemical Society, and Alpha Chi Sigma Professional Fraternity.

Mr. Goldman will work on the development of new products for Enthone, Inc.

RELIANCE
VARIABLE SPEED
LATHES

Reliance Variable Speed Lathes Cut Costs

There is a RELIANCE LATHE for every need.

Let us quote on your requirements.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS

Plating and Polishing Machinery

Complete Plating Plants Installed

Gen. Office and Factory:

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CLEVELAND

HEATING AND COOLING CONTROLS

Low cost - High accuracy

From high speed copper to chrome, and anodyzing to cleaning and rinsing tanks, Sarco has a complete line of temperature controls. The cost varies according to the problem involved, but for the purposes illustrated the simple, inexpensive Sarco LSI Electric Control will do the trick.

It combines accurate temperature indication with automatic control. It is used extensively for both heating and cooling because it costs less, is more reliable and because of the easy adjustment by thumb screw and the built-in dial thermometer.

This is only one of the many Sarco plating controls which range from the low cost Sarco Thermoton, for approximate control of cleaning and rinse tanks, to the highly accurate TR-21 regulator used on many automatic plating operations.

Our representative can show you how others have solved plating problems similar to yours.

49

SARCO COMPANY, INC.
475 FIFTH AVENUE
NEW YORK 17, N. Y.
Represented in Principal Cities

SARCO Saves Steam

SARCO CANADA, LTD., 85 Richmond Street, West, TORONTO, ONTARIO

Gordon R. Smith Now Directs Gripmaster Sales in Canada

Announcement has been made by *Nelson Chemical Company*, Windsor, Ontario, of the appointment of *Gordon R. Smith* as sales manager for Canada in charge of the company's *Gripmaster Division*.

In his new capacity, Mr. Smith, who has been with Nelson for the past four years, will direct sales for Gripmaster Polishing Wheel Cement, now marketed from coast to coast in Canada, as well as in the United States and several foreign countries.

Nelson Chemical Company, Windsor, is an affiliate of Nelson Chemicals Corporation, Detroit, Mich.

Aluminum Pre-Treatment

With the development of *Alodine* in the laboratories of the *American Chemical Paint Company*, Ambler, Pa., it is now possible to produce on aluminum the superior type of coating hitherto associated only with anodic treatments and to do it simply, rapidly and economically.

Alodizing is essentially a chemical process, requiring no electric current for its operation. It can be used advantageously for protection against corrosion, both on painted and unpainted aluminum Alodized and painted panels have lasted for over 2,000 hours in the salt spray. Unpainted panels in many cases have outlasted anodically treated panels subjected to the same corrosive environment.

ZINC PLATERS!

Cleanse & Purify your Zinc Solution with

McKeon's

Zinc-Brite

TRADE MARK REG'D.

Make your Zinc Bright

Information free—wire collect

Sulphur Products Co. Inc.

Greensburg 9, Pa.

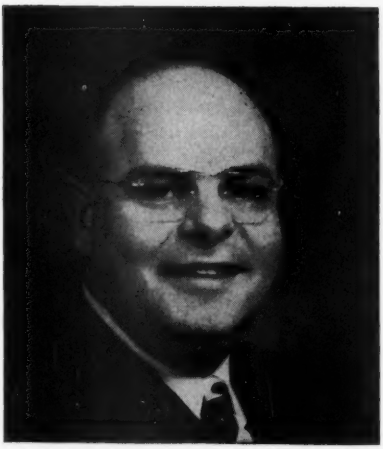
Aluminum to be Alodized is treated for two minutes or less in a chemical solution heated to a temperature no higher than 120° F. The next stage consists of either drying—if the work is to be exposed unpainted, or rinsing—if the work is to be painted or waxed.

Sealing, an extra and indispensable stage in most contemporary processes, chemical and electrolytic, is entirely eliminated as a separate stage. *Alodine* coats and seals simultaneously.

Outstanding characteristics of the coating are its stability, flexibility and adhesion which enable it to withstand all manner of bending and denting.

New Surface Treatment Bulletin

American Chemical Paint Company, Ambler, Pa., has just published its *Technical Service Data Sheet No. P-100–21, A Quick Reference List* to rust proofing chemicals, protective coatings, metal cleaning chemicals, and inhibitors. This 8-page bulletin contains much of interest to those engaged in plating and other surface treatments.



Optimus Detergents Appoints W. C. Thiess

William C. Thiess, of Philadelphia, has been appointed field service representative by Optimus Detergents Company, 120 Main Street, Matawan, N. J., manufacturers of industrial cleaning materials. He will cover Philadelphia and Baltimore areas.

Mr. Thiess has had an extensive experi-

PLATERS

THE FOLLOWING EXCELLENT REBUILT AND GUARANTEED ELECTROPLATING MOTOR GENERATOR SETS, WITH FULL CONTROL EQUIPMENT:

2—15,000/7500 AMPERE, 6/12 VOLT, **COLUMBIA ELECTRIC COMPANY** Latest Design Units with Separate M. G. Exciters.
1—5000/2500 AMPERE, 10/20 VOLT, **HANSON-MUNNING COMPANY,** Synchronous Motor Drive. Built 1941.
2—5000/2500 AMPERE, 9/18 VOLT, **CHARLES F. L'HOMMEDIEU** "RELIANCE" Units. Synchronous Motor Drive, Latest Design.
2—5000/2500 AMPERE, 6/12 VOLT, **A. P. MUNNING COMPANY** "OPTIMUS" Design, Separately Excited.
1—5000/2500 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE ELECTRIC COMPANY,** Interpole Design, Separately Excited.
1—4000/2000 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY,** Compound Wound, Separately Excited.
1—2500/1250 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY,** Shunt Wound, Separately Excited.
1—2000/1000 AMPERE, 10/20 VOLT, **COLUMBIA ELECTRIC COMPANY,** 25° Unit with Synchronous Motor Drive.
1—2000/1000 AMPERE, 6/12 VOLT, **HANSON-MUNNING,** 40° Unit, Interpole Design. Separately Excited.
1—1500/750 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS COMPANY,** Separately Excited Ball-bearing design.
1—1500/750 AMPERE, 6/12 VOLT, **COLUMBIA ELECTRIC COMPANY,** Latest Design, Separately Excited.
1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON ELECTRIC CO.** Unit. Synchronous Motor Drive. Direct Connected Exciter.
1—1000 AMPERE, 25 VOLT, **HANSON-VAN WINKLE-MUNNING COMPANY,** Separately Excited—Anodizing Unit.
1—**MEAKER** SEMI-AUTOMATIC CONVEYOR UNIT. For Cyanide Plating. Excellent Condition. 20 ft. x 3½ ft. x 4 ft. deep.
8—BURNISHING BARRELS—LINED AND UNLINED (**ABBOTT, BAIRD, GLOBE** UNITS). Various Sizes.
SELENIUM RECTIFIERS AS LOW AS $90.00. IMMEDIATE SHIPMENT.
ANODIZING MOTOR GENERATOR SETS—in stock for Sulphuric or Chromic Acid Solutions. Large Selection. Write for details.

M. E. BAKER COMPANY 143 SIDNEY STREET CAMBRIDGE, MASS.

ence in the industrial cleaning field, having formerly represented Oakite Products, and more recently been a member of the staff of Detrex Corporation.

Master to Richardson-Allen

Richardson-Allen Corporation announces the appointment of *Warren Master* to its engineering staff as Rectifier Engineer.

Mr. Master received his E.E. Degree from Lehigh University, and during the past twenty years has been engaged in the development of special electro-mechanical devices and equipment for the utility, industrial and aviation fields.

For several years prior to his present connection, Mr. Master was associated with Federal Telephone and Radio Corporation as development engineer on selenium rectifier equipment. In his new position he will continue his developmental work for the Richardson-Allen Corporation *Rectifier Division* on closely regulated D-C power supply equipment.

Honeywell Chicago Office Moves to Larger Quarters

The Chicago regional office of the *Minneapolis-Honeywell Regulator Company* and its industrial division, the *Brown Instrument Company*, has moved to a new location at 351 E. Ohio Street which will provide three times as much space as former quarters.

Fred Kaiser is manager of the Chicago regional office which supervises activity and

ONE SOLVENT

For all Metals or Combination of Metals

NEW SCIENTIFICALLY IMPROVED
BLACOSOLV
for SOLVENT VAPOR DEGREASERS

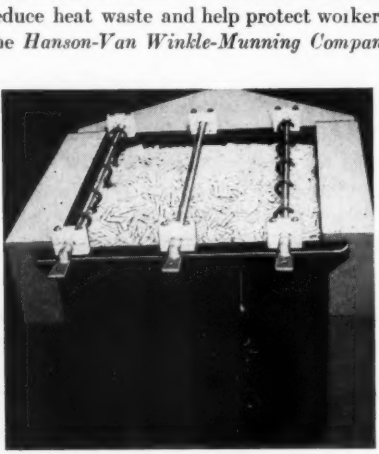
Write today for FREE BOOKLET ON Degreasers and application with Blacosolv.

G. S. BLAKESLEE & CO.
BLACOSOLV DEGREASERS AND SOLVENT
NIAGARA METAL PARTS WASHERS
G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS • New York, N. Y. • Toronto, Ont.

branch offices in Wisconsin, Illinois, Michigan, Indiana, Kentucky, Tennessee, Missouri, Arkansas, Kansas and Iowa.

H-VM-M Chrome Spray Floats

In order to minimize chromic acid loss, reduce heat waste and help protect workers, the *Hanson-Van Winkle-Munning Company*



of Matawan, N. J., has developed *Chrome Spray Floats* for use in chromium plating tanks. These floats are laid on the solution to a thickness of about one inch, forming a blanket which cuts escaping spray to a minimum. Also, the floats help to keep the heat inside the tank, thus conserving the supply of chromic acid. H-VM-M Chrome Spray Floats are, moreover, an effective auxiliary to ventilating systems.

The floats are yellow polystyrine tubes, 2¾ inches long, completely closed, and will float on the surface of the solution. Approximately one-half pound per square foot of solution surface area is required. They are practically indestructible and can be used indefinitely. They do not adhere to or interfere with the work in the tank.

Metal Cleaning Bulletin

Illustrated six-page service report provides full particulars and valuable new data on Oakite *"CrysCoat" Process* for precleaning, conditioning, and rust-inhibiting ferrous metal surfaces prior to organic finishing. New data on methods of applications, working concentration, *p*H determination and rinsing procedures, recommended operating temperatures, and production suggestions are included. Write to *Oakite Products, Inc.*, 157 Thames Street, New York 6, N. Y., for your copy.

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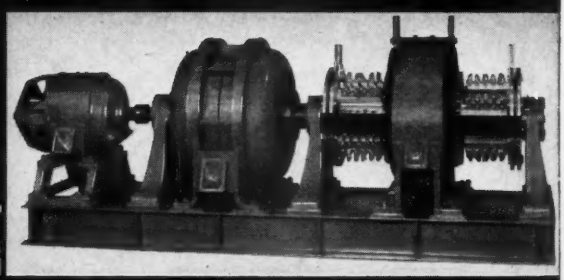

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The Medical Profession has definitely recognized that the body requires additional salt during the hot summer months if fatigue is to be eliminated.

Clinical findings have substantiated that most salts are only absorbed in the system through the walls of the small or upper intestine and are not digested or absorbed in the stomach. Sodium chloride (salt) comes under the above classification.

Pep-up Tablets have an exclusive patented coating designed so that the contents will not be absorbed by the stomach, but will dissolve readily in the small intestine. The *United States Safety Service Company*, 1215 McGee Street, Kansas City, Mo., that produced "Pep-up" Tablets, has also devised a new *Expendable Dispenser*.

Aluminum-Coated Mirror Developed

An *aluminum-coated mirror* with the metal on the front surface of the glass, designed primarily for use in scientific instruments where a reflection of high perfection is desired, has been developed by the *Libbey-Owens-Ford Glass Company*.

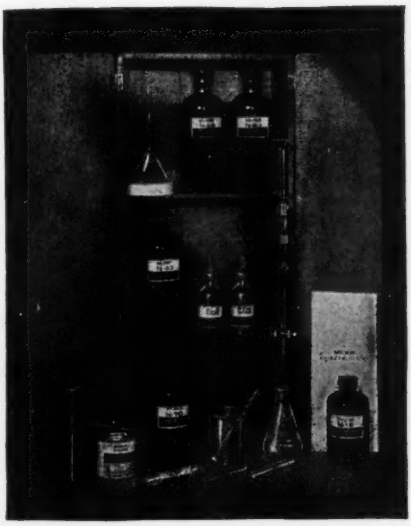
The mirror, now in production by the *Liberty Mirror Division* of the company at Brackenridge, Pa., has the advantage of reflecting only a single image while a back-surface reflects a faintly discernible added image from the front surface of the glass.

In the manufacturing process, by a method called thermal evaporation, a coating of hard quartz is deposited on the aluminum to insure the durability of the metal film.

Col. Leslie S. Fletcher Joins Sam Tour & Company

Sam Tour & Company, Inc., and its affiliate, the *American Standards Testing Bureau, Inc.*, both of 44 Trinity Place, New York City, are pleased to announce the appointment of *Colonel Leslie S. Fletcher* as Technical Director.

Col. Fletcher is being retired from the Regular Army for physical disability having completed twenty-three years of commissioned service. He graduated from the United States Military Academy at West



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Point in 1924, spent two years in post-graduate work in Mechanical Engineering at M. I. T. and in Metallurgical Engineering at Watertown Arsenal. After graduating from the Ordnance School in 1932, he spent four years as director of the laboratories at Rock Island Arsenal. Here he was closely associated with the initial development of the metallic machine gun link, stainless iron recuperator cylinders, nitrided parts for tank tracks, the rubber bushed tank track and other items.

In 1936 Col. Fletcher was transferred to Frankford Arsenal where he became military director of the Frankford Arsenal Ordnance Laboratory. During the four years in which he was the Officer in Charge of this laboratory, it was expanded from a small fifteen-man organization to a laboratory occupying its own buildings and employing over three hundred scientists and technicians. For four years he was a member of the Ordnance Department's Ferrous and Non-Ferrous Metallurgical Advisory Boards. Following overseas service he was assigned to duty as the Chief of the Artillery Ammunition Branch, Ammunition Development Division, Research and Development Service Office, Chief of Ordnance, Washington, D. C.

Col. Fletcher has been active in many organizations. He is a past chairman Tri-City Chapter, American Society for Metals; Treasurer and Chairman Educational Committee, Philadelphia Chapter, American Society for Metals. He has served on several A. S. T. M. committees. He is a member of A. I. M. E. He is also a former member of both the Moline, Ill., and Philadelphia Rotary Clubs.

Tagliabue Moves Chicago Office

The C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y., a subsidiary of *Portable Products Corporation*, announces removal of its Chicago district sales offices from 608 S. Dearborn Street to Room 1120 Merchandise Mart, Chicago 54, Ill.

The new larger offices include a showroom for displaying *TAG* temperature and pressure indicating recording and controlling instruments.

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H-VM-M Electric Glue Heater

The *Hanson-Van Winkle-Munning Company*, Matawan, N. J., announces the development of a new portable electric glue heater.

This unit is well constructed, provides quick heat, automatically held at 150 to 160° F by a thermostat and is thoroughly insulated to prevent heat loss. The removable glue pot is of copper, nickel plated for corrosion and wear resistance. A heavy duty, insulated electric cord is supplied with each heater.

The capacity of the electric glue heater is two quarts. It is designed for regular 115-volt ac current. Special units for 230-volt ac current can be supplied.

The use of these glue heaters improve the efficiency of any polishing room.

Udylite Issues Buff and Compound Bulletin

A six-page folder illustrating a wide variety of buff sections and compounds and describing their applications may be had by addressing *The Udylite Corporation*, 1651 E. Grand Boulevard, Detroit 11, Mich.

Full Automatic Plating Conveyors

A revision of *Bulletin No. FA-103* has been issued by the *Hanson-Van Winkle-Munning Company*, Matawan, N. J. This bulletin, originally published in June, 1946 has been reprinted with revisions covering the full line of plating conveyors, including the elevator type, the Munning type, the Straight line type, special plating machines, caustic cleaning lines, tin plating lines, wire and cable plating lines and zipper plating equipment.

Tube Support Stand for Use with Tube Polishing Machines

More uniform polishing and more efficient handling of long tubing on Semi-Automatic Tube Polishing Machines is afforded by *Presto Tube Support Stands*, developed by *The Manderscheid Company*, 810 Fulton Street, Chicago 7, Ill.

The tubing rests on two rubber wheels located on top of the tube support stand. By adjusting the angle of the wheels, the movement of the tubing across the polish-

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ing wheel or abrasive belt can be regulated to the required speed. Holds tubing from ¾ inch to 5 inches in diameter and is adjustable from 28 to 38 inches high.

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Anti-Corrosive Finish for Metal, Wood, Concrete

"*P-5*", an anti-corrosive Co-polymer Finish, is a series of coatings for protecting metal, wood, and concrete against corrosion from exposure to moisture, acids, alkalies, and other disintegrating elements. In addition to its chemical resistance, it is free from objectionable odors, is non-toxic, and dries by evaporation without requiring an oxidation period. It has good thermal stability, is highly resistant to abrasion, and has good aging characteristics.

Films of "P-5" 0.0025 inch thick were immersed in various reagents for six months and found unaffected when removed. The reagents included 3 per cent acetic acid, 10 per cent sulfuric acid, 10 per cent hydrochloric acid, 10 per cent nitric acid, 29 per cent ammonium hydroxide, and 10 per cent sodium hydroxide. It is available in nine colors from *Watson-Standard Company*, 225 Galveston Avenue, Pittsburgh 30, Pa.

Atlas Powder Companie's Products Dept. has New Manager

Edw. H. Bucy has been appointed general manager of the *Atlas Powder Company's* cellulose products department, according to *Isaac Fogg*, president of Atlas.

In his new capacity, Mr. Bucy heads both sales and production acitivites of the *Zapon-Keratol Division* and the *Zapon Division*. The former division manufactures coated fabrics at the plant in Stamford, Conn., while the latter makes industrial finishes, including enamels, varnishes, synthetics, etc., at plants in Stamford and North Chicago, Ill.

Mr. Bucy has been actively engaged in the protective and decorative coatings industry for over twenty-five years and has been instrumental in the development of several new finishes which have proved popular and been widely accepted.

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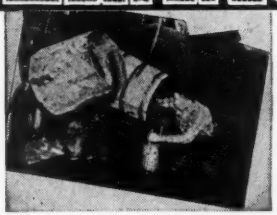

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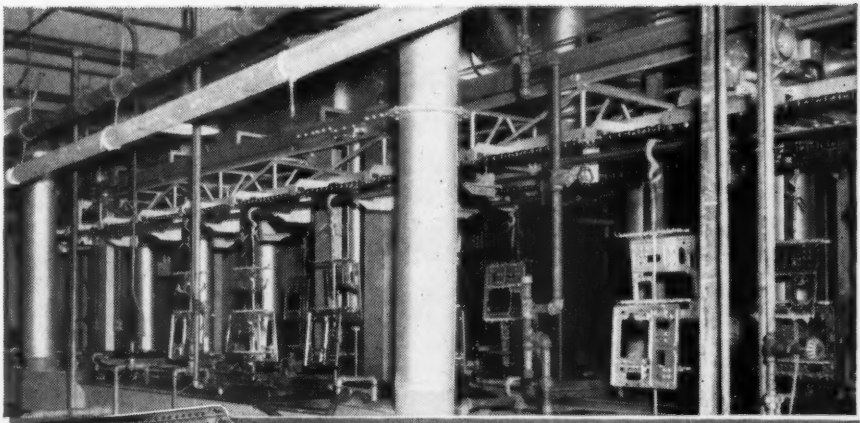

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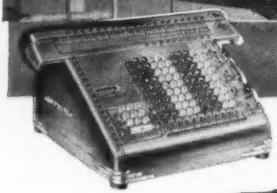

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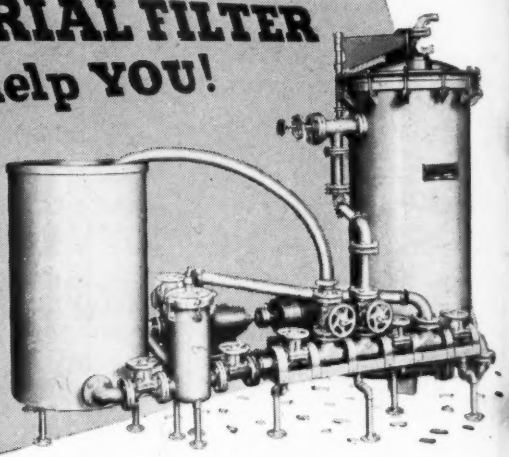

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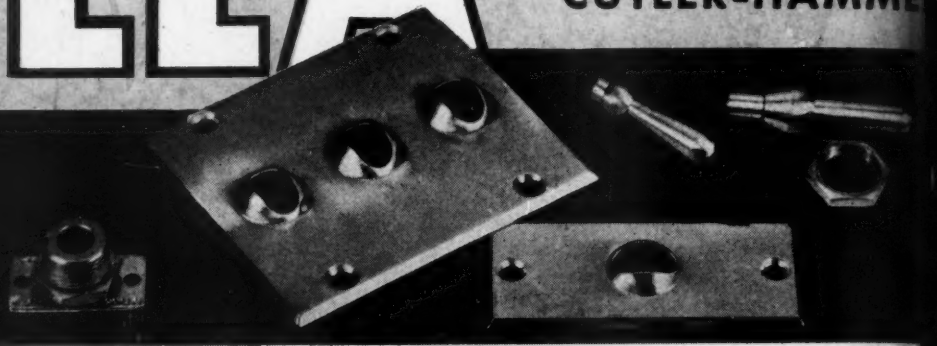

Switch Levers, Threaded Bushing, Hexagon Face Nuts, Single Switch Plate, 3-Gang Switch Plate

Many thousands of these small parts are made each week by Cutler-Hammer, Inc., Pioneer Electrical Motor Control and Appliance Switch Manufacturers of Milwaukee. They're parts used in assembling the utility type toggle switch, one of a broad line of electrical controls made by this well-known company. Each part is satin finished with Grade C LEA Compound by a method which LEA Technicians helped to work out. It's a finish that implies "quality", a characteristic which all Cutler-Hammer products have.

Perhaps we can help you, too, in your burring, buffing or polishing problems. LEA Compositions used with a LEA Method may help you cut costs and improve the quality of your finishing.

THE LEA MANUFACTURING CO. 16 CHERRY AVENUE WATERBURY 86, CONN.

Burring, Buffing and Polishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions